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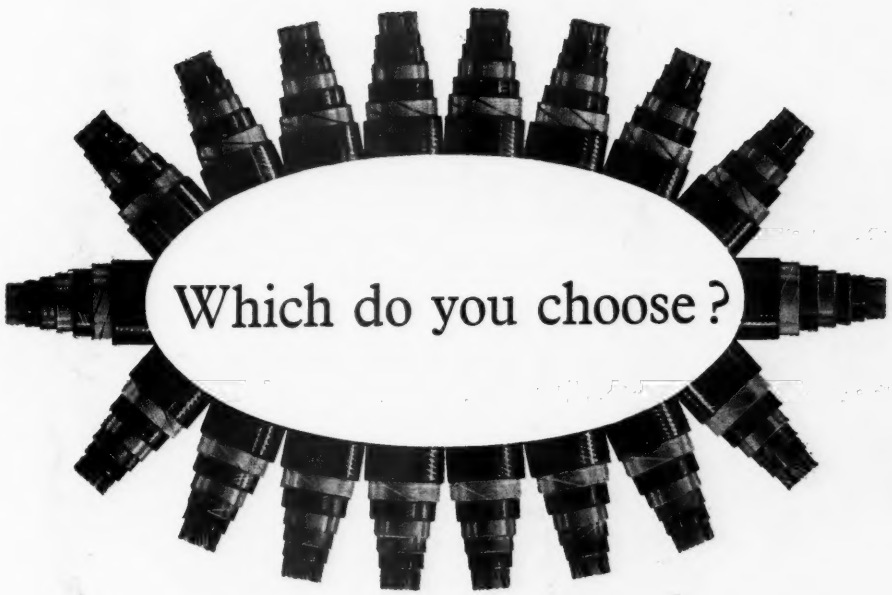
ELECTRICAL REVIEW

15 MARCH 1957 PRICE 1/6d



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ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

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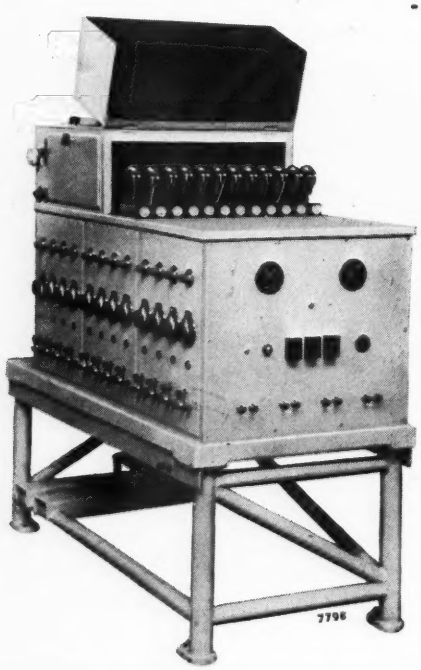

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ELECTRICAL REVIEW

15 March 1957 Vol. 160 No. 11 Established 1872

Men, Materials and Money

WILL the expanded nuclear power programme announced last week prove too great a strain on national resources? The question was put to Lord Mills at his Press conference last week and he was reassuring, although he did show some reserve when he said that the programme was a flexible one.

It seems to us that the one thing likely to impede the prosecution of the plan is the difficulty, common to all technical industries, of securing an adequate supply of the right men to operate the stations. Generally speaking, this means increasing the number of technicians who will be required for the running of " conventional " stations and, in so far as the nuclear stations are alternatives to conventional ones, this need already existed. The real staffing problem is on the reactor side, but the Central Electricity Authority, in co-operation with the Atomic Energy Authority, is taking steps to deal with it.

Next the position in respect of the supply of materials has to be thought of. Here, too, similar considerations apply. The steam-raising plant represents only a different use of materials which would be used in conventional stations anyway; it is the reactors and their housing which require special attention. There will apparently be no shortage of " fuel," for world supplies of uranium are being rapidly developed. Large quantities of specially machined graphite are required for the moderators and at present sources of supply are limited; but this is also being taken care of and production will be kept in step with the requirements. Much steel of more than common thickness is needed for the pressure vessels and it was no doubt this to which Lord Mills referred when he said that supplies of steel were being arranged.

Is the capacity of the manufacturers going to be sufficient? Once more it has to be stressed that the nuclear power programme forms only part of the general expansion of generating plant and the additional burden should not overwhelm the manufacturers. Theirs, too, is largely a problem of scientific and technical man-power which they are meeting by specially training people already with them and acquiring new blood from the universities and technical colleges. There seems to be confidence that our manufacturers will not only be able to take on the contracts for the proposed twenty stations (one in Northern Ireland) but also be able to cope with the export orders which they hope to secure, beginning in two or three years' time.

Finance has been mentioned as a possible limitation, but surely money is only a measure of national resources in men and materials. Suggestions have been made that the heavy investment in nuclear power will mean depriving other sections of the national economy of the resources which they need. To this it can be answered that the extra investment in the power programme as a whole will be £750 million over the period up to 1965, by which year the capital expenditure on power plant will be running at about £400 million a year. In an expanding economy the addition should be easily shouldered. Indeed the programme has to be carried out if we are to survive as an industrial nation, for power is the foundation of prosperity.

LESSENING CORROSION

Despite the great loss of metals through corrosion, relatively little use has been made until recent years of cathodic protection, the principles of which were known early in the last century. The tardy progress has been, no doubt, due in part to an incomplete understanding of the reasons for electrochemical reactions which varied from one application to another and to doubts, arising out of lack of long-term experience, as to whether the success achieved would justify its cost.

With modern large-scale developments, such as the laying of long, costly pipelines for transmitting oil, the additional expenditure for protection quoted in this issue from the I.E.E. paper of Messrs. Hobgen, Spencer and Heselgrave seems a small insurance premium against high maintenance charges and risk of breakdown. The proportion of the total cost is small enough to encourage the hope that the method of protection can be extended economically to more numerous smaller installations.

EUROPEAN CO-OPERATION

British electrical manufacturers are naturally apprehensive about the possible effects of the establishment of a common European market—a subject dealt with on p. 469 of this issue. They fear that the lowering or elimination of import duties would open their home market to a flood of cheap Continental products. Our contributor endeavours to show that these fears are not well based; sufficient safeguards will be provided by the new anti-dumping legislation.

If this country were to refrain from joining in the scheme the result would be a virtual ban on our exports to the Continent and the principal beneficiary would be the German electrical industry which would be strengthened as a competitor not only in Europe but also in other markets. Thus for good or ill we are practically compelled to co-operate. It must be remembered that the changes will be made over a long period, giving time for a gradual adjustment.

SOUTH SCOTLAND PROGRESS

The satisfactory financial position of the South of Scotland Electricity Board shown in its annual report (see p. 483) appears to be due mainly to two factors: an advantageous arrangement for the purchase of bulk supplies which enables the maximum demand to be kept at a low figure; and successful development, particularly of off-peak load. The all-electric multi-storey flats at Kirkcaldy, where off-peak floor heating is provided in the living rooms, have attracted wide interest among local authorities and similar flats are now being built both in the Board's area and elsewhere. Altogether 35,690 kW of off-peak load was connected last year, making a total of 92,394 kW. The Board is also in the happy position of being within sight of completion of its change-over programme and in the field of rural development a comprehensive plan has been prepared which aims at bringing supplies to all parts of the area by 1960.

RAILWAY PLAN

Work on the 1955 Modernisation Plan of British Railways is gathering momentum. Last week Sir Brian Robertson stated that of the total expenditure of £1,200 million envisaged over a third has now been allocated for a variety of developments, including £92 million in respect of electrification. Those who questioned the "half-way to electrification" policy represented by the introduction of diesel locomotives will derive satisfaction from Sir Brian's forecast that the electrification projects set out in the Plan will be completed well before 1970 and that further electrification could be undertaken in the later 1960's. This year's expenditure on electrification work, apart from rolling stock, is to be £7½ million and it will rise to £11½ million next year.

REACTOR POISONING

The main reason for operating nuclear power stations of the graphite moderated type continuously is economic. Their high capital charges and low fuel costs, compared with coal- or oil-fired stations, call for the production of as many kWh as possible for each kW installed. For high-flux reactors, however, such as those using heavy-water moderators with enriched fuel, the economic argument in favour of high load-factor operation is reinforced by a technical one, which was developed by Mr. G. J. R. MacLusky in his I.E.E. Measurement and Control Section paper reported in this issue (p. 485). That is the large increase in the normal loss of reactivity due to xenon poisoning if a reactor is shut down or even if reactor operating power is suddenly reduced, which may make it difficult to restore operating coditions to their normal level for an appreciable time.

NUCLEAR PLANT FOR JAPAN

After the recent visit of a Japanese delegation to this country's atomic energy establishments it was confidently stated that Japan would order a "Calder Hall" type of reactor from Great Britain. Later it was reported that the Japanese Atomic Energy Commission was hesitant, various reasons being adduced, whether to decide upon the British reactor or an American type. Now it seems that the successful operation of Calder Hall has convinced the Commission of the practicability of the British graphite-moderated gas-cooled reactor and it intends to buy a 100 MW one. A further mission is said to be coming to this country to make the necessary arrangements.

VACUUM CLEANERS

In the next of our illustrated surveys of domestic electrical appliances (22nd March) we shall be dealing with vacuum cleaners. Particulars, given in tabular form, will include details of type, motor rating, accessories, special features, price and purchase tax. The subject of the following survey (12th April) will be floor polishers

Railway Signalling Circuits

By B. K. COOPER

Methods Adopted for Steam and Electric Lines

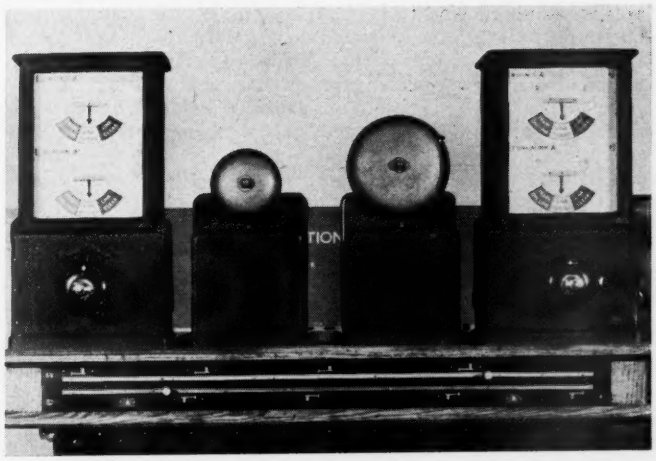


Fig. 1.—Block telegraph instruments and bells

SIGNALLING, in its widest sense, of the control of train movements, was the first sphere of railway working to benefit from electrical apparatus. Originally, this was in the form of the electric telegraph, for as early as 1837 Cooke and Wheatstone demonstrated the use of telegraphy for communicating between Euston Station and the top of the Camden incline, up which trains at that time were hauled by a steam winding engine. In 1844 the telegraph was installed on the Norwich and Yarmouth Railway, two years after Cooke had published a pamphlet urging the importance of a telegraph system in ensuring safe working over single lines.

In later years the railway telegraph developed in two forms, one being the ordinary Morse single-needle telegraph and the other a specialised instrument for "offering" and "accepting" trains from signal box to signal box by a code of bell signals, and for giving a visual indication of whether a section of line was clear or occupied.

To-day the mention of electricity in railway signalling usually suggests the use of colour-light signals and power-operated points, but electrical safeguards associated with mechanical signalling and the operation of the signal box telegraph instruments are of much earlier origin than the first power schemes. Their modern developments are still to be seen on many miles of main and branch lines.

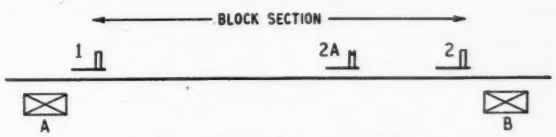


Fig. 2.—Signals in a block section

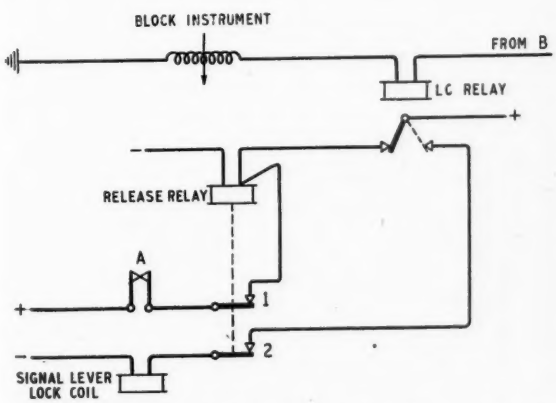


Fig. 3.—Locking circuit for signal lever controlling entry to a block section

Electric Locks

The principle of the block system of railway signalling, in which the line is divided into block sections and only one train is normally admitted to a section at a time, is generally familiar. An electric lock on the signal lever giving admission to a section, released only by receiving "line clear" from the box ahead, is one of the methods of ensuring compliance with the rules of block working. A further step is necessary in this electrical safeguard, however, for when the signal has been pulled "off" (i.e. to show "line clear") and restored to "on" (danger) after the train has passed, it must be locked again until the signalman ahead has sent "line clear" for a second train.

Block telegraph instruments and bells of the type used for exchanging messages between signal boxes are shown in Fig. 1. In the type illustrated the bell code is transmitted by operating a plunger, the head of which can be seen on the front of the case. It is concentric with a commutator handle which is turned to right or left to change the indicating pointer from its central "line closed" position so as to show "line clear" or "train on line." The instruments are connected by a three-wire circuit and energised by 10 V batteries.

Considering two successive signal boxes, A and B (Fig. 2): when the signalman at B is able to accept a train from A he operates the commutator handle of his block telegraph instrument to set it, and A's also, at "line clear." A circuit by which this action can be made to unlock signal 1 (Fig. 2) is shown in Fig. 3.

The circuit which energises A's block telegraph instrument to "line clear" also energises the relay LC, causing its contact to change over and make a circuit through the coil of the lock on the lever for signal 1. When this lever is pulled, contacts A, which may be controlled by the

signal operating rod, are opened and the release relay is de-energised. The feed to the lever lock coil is therefore broken at contact 2, so that the lock is no longer held released and will drop back into position as soon as the lever is returned to the " danger " position. In this condition the feed to the release relay is still broken at contact 1. The release relay cannot be re-energised to prepare the circuit for unlocking the signal lever until the LC relay has been returned to normal by B restoring his block instrument to " line closed," as a preliminary to sending the next " line clear."

In B box, when " train entering section " is received by bell signal from A, the signalman sets the block instrument at " train on line," the indication being repeated at A. This action energises and releases a lock on B's signal 2 and enables him to pull it " off." The block instrument is now locked at " train on line " and remains so until the train has passed out of the section. Consequently, B cannot again give " line clear " to A until the section is unoccupied.

One method of proving that a train has passed a given point—in this case the end of the section—is a rail treadle. The type of treadle illustrated in Fig. 4 operates by the flexure of the rails under the weight of a train causing

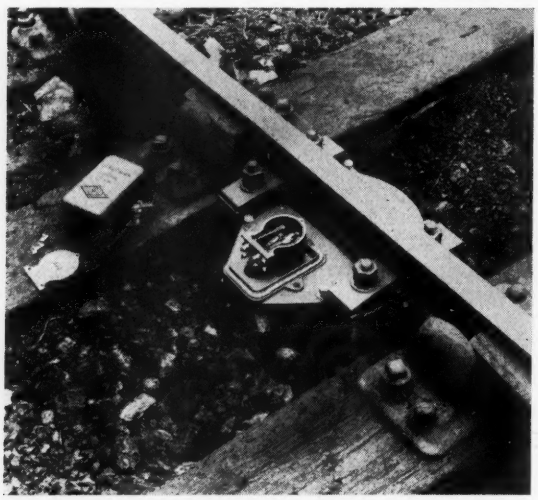


Fig. 4.—Mercury type treadle attached to rail, with cover removed to show contacts operated by the passage of trains

mercury to be pumped into a float chamber so that contacts attached to the top face of the float are operated. In this way a circuit can be made to the coil of the lock on the block instrument commutator handle.

Relay Interlocking

When electrical methods were applied to the actual operation of signals and points, it was no longer necessary to provide the large levers required to give the necessary purchase with mechanical working. Consequently, miniature levers controlling electrical contacts were used. Electric locks of the type described already were applied to the levers, but often the interlocking between levers which controls the sequence in which they can be operated remained mechanical. An example would be the interlocking of the levers controlling signals 2A and 2 in Fig. 2 to ensure that the distant (or warning) signal 2A could not be pulled " off " before the " stop " signal 2. Eventually the use of electrical controls for interlocking as well resulted in the replacement of levers by key switches of various types and the application of relays to produce the effects of interlocking. This principle is known as relay interlocking. No physical locks are required on the key switches because the relays prevent dangerous conditions being created in the event of incorrect operation.

A separate key switch may be provided for each function, such as the control of signals and of points, but it was a logical step forward to make a single relay set the points and then clear the signal for a particular route. Schemes based on this principle are known as route relay interlockings, and are the usual form of new power signalling to-day.

Fig. 5 shows the elements of route relay interlocking. A and B are key switches, shown in the "normal" position in which the signals are at " danger " and the points are set for the straight-through route (route B). In this condition the N coil of the signal relay is energised and both coils of the point relay are de-energised, although its contacts remain latched in the position to which they were last operated.

If a train is to be signalled to route A, the A switch is turned. Although this breaks the feed to the N coil of the signal relay, contacts 1 and 2 remain latched in. Consequently a circuit is made to the R coil of the point relay, causing the points to be reversed (i.e. set for the diverging route). Energisation of the R coil also closes contact 3, so that a feed is made to the R coil of the signal relay. This clears the signal for route A and simultaneously unlatches contacts 1 and 2. It will be seen that even if switch B is now inadvertently operated, there will be no feed to the point relay N coil and consequently the points cannot be changed. Similarly, the signal for the straight-through route cannot be cleared, for the energisation of the point relay R coil has released contact 4.

The form taken by the control switches and their arrangement in the signal box have several variations. A separate key may be provided for setting up each route, or a single key in conjunction with a selector may control two or more routes. An alternative arrangement is for a separate key to be allotted to the beginning and the end of a route, both having to be operated in order to set it up. The keys may be located on a diagram of the tracks in positions corresponding to those of the actual signals and points they control (Fig. 6), or on a desk in front of the diagram.

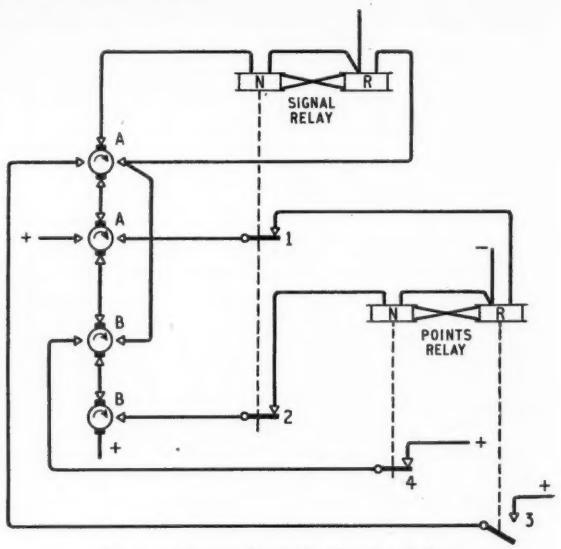


Fig. 5.—Elements of route relay interlocking

In practice many control circuits additional to the simple ones described in the above example are involved in relay interlocking. Some of these are track circuits which detect the presence of trains and prevent premature clearing of signals or changing of points. Electric point machines, having thrown the points, bolt them in position, and detector contacts associated with the bolts ensure that the circuits controlling the signal are not completed until the bolt is home.

The track circuit takes various forms and has an extremely wide range of functions which it exercises through multi-contact relays. In addition to its safety controls when signals and points are operated by signalmen, it is the basis of automatic signalling in which, over long distances, signals are controlled, and the requirements of the block system maintained, by the passage of the trains themselves. In the simple d.c. case on steam-worked lines, the track-circuited sections of line are isolated electrically by means of insulated rail joints from their neighbours. A battery is connected across the rails at one end of the track circuit and a relay at the other end. When no train is present the relay is energised, but when a train enters the track circuit its wheels and axles shunt the relay coil and cause its contacts to be released. One application would be to use a track circuit instead of a treadle of the type described earlier in connection with electrical safeguards in mechanical signalling. Release of the relay by the passage of a train could then be made to unlock a block telegraph instrument from "train-on-line" and so enable a second train to be accepted.

Fig. 6.—Route relay interlocking control panels at Liverpool Street Station signal box

On d.c. electrified lines where the running rails are used as traction current return conductors, simple track-circuit systems of the type just described need modification so that the apparatus will be immune from the effect of the return current from the trains. Recent examples of modifications for this purpose have been seen on the Chelmsford and Southend extensions of the British Railways, Eastern Region, 1,500 V d.c. electrification in the London area, where a.c. track circuits have been substituted for d.c.

Auto-Impedance Bonds

If only one rail is needed for the traction current, it can serve as a common traction and track circuit return conductor. The track circuits are then formed by the insertion of insulated joints in the second rail and are known as single-rail track circuits. Where both rails are needed for the traction return, as on densely-occupied or steeply-graded sections of line, means must be provided for the d.c. to by-pass the insulated rail joints necessary for defining the a.c. track circuits. A method of effecting this by the use of auto-impedance bonds is shown in Fig. 7.

Referring to the figure, it will be seen that the d.c. flows in opposite directions through each half of the bond windings so that the magnetic fluxes cancel each other and the impedance presented to changing current is zero. On the other hand, the bonds present their normal impedance to the track-circuit a.c.

In the typical arrangement shown, T is a 1:1 transformer and the feed capacitor C_1 is adjusted so that the voltage across the rails is between 3 and 9 V, this low value being necessary to ensure that the relay is not shunted by leakage through damp sleepers or ballast. R is known as a two-element relay, being held operated by a state of balance between the torques of two coils, a condition obtained by adjustment of the phasing capacitor C_2. Shunting of the track by a train disturbs the equilibrium and causes the relay to be released.

Where lines already equipped with power signalling suitable for use in conjunction with d.c. traction are to be converted for industrial frequency a.c., the choice of track-circuit frequency will demand a sufficient difference between the signalling and traction frequencies for reliable discrimination. This may be achieved by generating and distributing a special signalling supply at 83·3 c/s. New signalling schemes for industrial-frequency lines where there is no risk of extraneous interference from direct current are likely to be d.c., but a.c. at 83·3 c/s might be adopted where such a risk exists.

A contract awarded in February to the Siemens and General Electric Railway Signal Co., Ltd., was the first to be announced since the 50 c/s traction system was adopted by British Railways, for signalling modifications arising out of it. On the lines concerned, from Colchester to Clacton and Walton, single-rail d.c. track circuits and protection of d.c. signalling apparatus by series inductances will be suitable for the most part, but two-rail track circuits and a special frequency will be required on routes such as Liverpool Street to Chelmsford and Southend-on-Sea. Here the 50 c/s signalling circuits installed recently for immunity from d.c. traction current interference will have to be adapted for immunity from a future traction supply at their present frequency. In addition, before the change-over to industrial-frequency traction takes place, the modified circuits will be required to operate for a time in conjunction with the existing 1,500 V d.c. supply and not be affected by it.

The natural desire to use the industrial supply for all

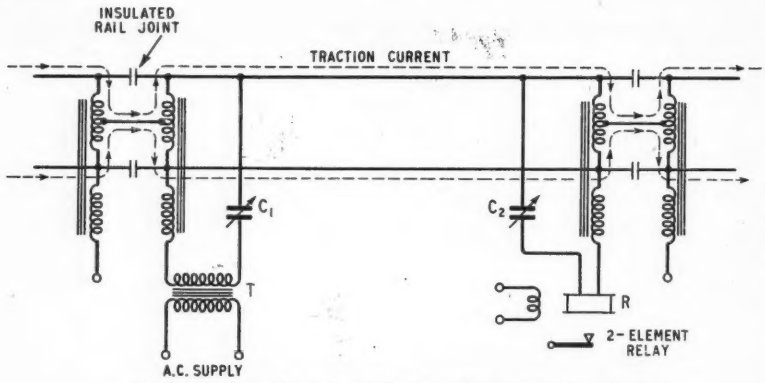


Fig. 7.—Double-rail a.c. track circuit with auto-impedance bonds

purposes has led in France to the development of an alternative method with valve oscillators generating a frequency of 1,000 c/s. The oscillators are fed through transformers from the 50 c/s mains and incorporate a grid-blocking circuit which breaks up the output into wave trains of 13 millisec duration, followed by interruptions of 37 millisec. Consequently the basic 1,000 c/s frequency carries a 20 c/s coding. In this way additional security is gained from interference with the signalling circuits by harmonics of the traction frequency, a point of particular importance when rectifier locomotives and motor coaches are used. Amplifiers are used at the relay ends of the circuits to ensure satisfactory holding of the relays in spite of the attenuation of the track-circuit frequency in the rails on long sections.

Power Supplies

It was shown at the beginning of this article that electrical circuits and apparatus are widely used in many circumstances other than those of complete power signalling schemes. While at one time primary batteries were a common source of supply for items such as block instruments, lever locks and isolated colour-light signals (often installed between existing semaphore signals to break up long sections and so help to keep the traffic moving), it is general to-day to use secondary battery and trickle-charging equipment, operating on a normal single-phase supply. Individual batteries, located as close as possible to their associated apparatus, are installed for working signals and points remote from a signal box. Supplies for lever locks, block instruments and nearby outdoor equipment are located in the signal box itself. Colour-light signal lamps are operated at 12 V or 24 V as this enables a short, sturdy filament to be used and makes it easier for the optical system to concentrate the light into a long-range beam. Often the lamps are two-filament types so that, if the main filament fails, a second, lower-rated filament maintains the signal in operation at reduced brilliance—a fact which would be noted by passing drivers and reported. It is now becoming more usual on British Railways to provide two single-filament lamps of the same rating and to bring the second into operation automatically by a relay in case of failure, a warning being given simultaneously in the signal box.

Point machines installed for convenience of long-distance control are often operated from a local 30 V supply, but in complete power interlocking schemes they generally work at 110 V d.c. Where it is inconvenient or impracticable to install trickle-charging equipment and a local battery at points too far from a signal box for mechanical operation, hand-operated generators are often used overseas and to some extent in this country. Although operation of the points is slower than when a battery or mains supply is available, hand generators may save the expense of providing additional signal boxes and staff. Existing semaphore signals may be modified for electric working by means of signal machines comprising a d.c. motor and a reduction gear train for driving the signal arm spindle direct or, if the machine is to be mounted at the bottom of the post, through rodding.

In large colour-light signalling installations to-day power is generally taken direct from the mains and every effort is made to obtain supplies from two sources with the largest possible measure of independence. One of these would be a normal and the other a standby supply, generally with automatic change-over in the event of either failing. It is now becoming increasingly common to provide in addition a standby diesel-alternator set with automatic starting arrangements.

At the signal box to which the power is fed, duplicate transformers are installed to provide a 110 V supply for control circuits, point machines and colour-light signals, the colour-light lamps being connected to local step-down transformers. In the larger installations it is usual for several signal boxes and other places to need a power supply, and the method preferred is to install duplicate step-up transformers feeding a ring main or duplicate cables. A distribution voltage of 650 V is chosen when possible in the interests of economy in the size of cabling.

The extension of power signalling, a major item in the expenditure of £100 million allotted to signalling and telecommunications generally in the British Railways' modernisation programme of 1955, increases the concern of the signal engineer with supply and distribution questions. As in the field of traction, therefore, there is taking place a progressive overlapping of interests between the railway specialist and the general power engineer. The applications of electricity in railway signalling are so numerous and varied that a single article can do no more than prepare the way for further study of a subject of growing interest to many sections of the industry.

Acknowledgment is made to the Siemens and General Electric Railway Signal Co., Ltd., for assistance in the preparation of this article and supplying illustrations.

European Nuclear Research

SIR BEN LOCKSPEISER, President of the Council of European Organisation for Nuclear Research, discussed various aspects of the Organisation in an address he delivered to the Royal Institution on 8th March. He said that in the field of nuclear physics the means necessary for controlled experimentation had increased beyond the single capacities of most nations. The Organisation (CERN) was therefore brought into being.

The first task of the Organisation was to provide itself with research tools, chief of which was the particle accelerator. Two machines, each of different type, were being built at Meyrin, near Geneva—one, a synchro-cyclotron, in which the path of the accelerated particle was a flat spiral, and the other, a proton-synchrotron, which accelerated the particle in a repeated circular path. Their energy levels were 600 MeV and 25 GeV respectively. Some indication was given of the nature of the scientific and technological problems which had to be solved in the course of design and construction.

Railway Modernisation Programme

Rapid Progress of Electrification Projects

THE programme of improvements and re-equipment to be carried out in 1957, together with a forecast of some of the principal schemes likely to be started in 1958, under the British Railways' Modernisation Plan, were announced at a Press conference last week. Over one-third of the total sum of £1,200 million to be spent under the 15-year Plan is now committed to various developments already in progress or authorised. Large individual programmes of expenditure already authorised include £92 million for electrification, £33½ million for diesel main-line and shunting locomotives, £32½ million for diesel multiple-unit trains and £46 million for major works such as track widening, new junctions, and station and depot reconstruction schemes. In 1957 the Commission and the railway management hope to build up an output nearly half as great again as that of 1956, while the provisional forecast for 1958 shows a still further increase.

Prospect of Additional Schemes

In announcing the programme, Sir Brian Robertson, chairman of the British Transport Commission, said that the pace was increasing rapidly, and there were already signs that the electrification projects would be completed well before 1970; they might thus well be able, in the later 1960's, to undertake additional electrification and they were considering further projects at this time. The quickening pace of the plan gave further emphasis to the need for a larger body of technical staff. They had already recruited a valuable nucleus of extra talent, but more young men were wanted in all the technical departments of British Railways.

The programme for 1957-58 includes deliveries of 20 electric main-line locomotives, over 160 diesel main-line locomotives, and more than 500 diesel shunters. In addition, about 1,700 powered coaches for multiple-unit electric and diesel trains should be delivered.

Of the £92 million authorised for electrification, it is expected that the expenditure to be incurred on these schemes, excluding the provision of new rolling stock, will amount to something like £7½ million in 1957 and £11½ million in 1958. Expenditure of the order of £16 million will be incurred on new electric locomotives and multiple-unit coaches for electric trains. It is expected that 20 locomotives will be produced in 1958 and 230 and 800 coaches in 1957 and 1958 respectively.

As regards the progress during 1957 of electrification schemes already announced, planning for the electrification of the line from Fenchurch Street to Tilbury and Southend is continuing. Work on some of the extensive preliminary engineering works in the neighbourhood of Barking is already in hand, and authority has now been given for the provision of facilities at Ilford, East Ham and Shoeburyness, for the repair, inspection and cleaning of the electric stock, and the provision of clearances for the overhead equipment between Fenchurch Street and Upminster. The total estimated cost of this scheme is nearly £20 million, and it is expected that it will be completed in 1961.

Work is starting this year, and will be finished next year, on the electrification of the lines from Colchester to Clacton and Walton, which will be used as a proving ground for electrical overhead and signalling equipment on the 25 kV a.c. system.

A start has been made on preliminary engineering work in connection with the electrification of the Eastern Region suburban line from Liverpool Street to Enfield and Chingford, Hertford and Bishops Stortford, estimated to cost £6½ million, and expenditure of the order of £1½ million will be incurred in 1957 and 1958. Completion is scheduled for 1960.

Preliminary work on track, bridges and telecommunications is in progress in connection with the electrification of the Manchester-Crewe line. This pilot scheme for the electrification of the main lines between London, Birmingham, Liverpool and Manchester, is provisionally estimated to cost £10 million and is scheduled to be brought into operation in 1959.

About £1½ million will be spent in 1957-58 on Stage I of the Glasgow suburban electrification (Airdrie-Helensburgh, including Milngavie and Balloch Pier; Cathcart Circle; Cathcart East Junction to Kirkhill and Neilston High); it is expected that these works will be completed in 1962.

About £7 million will be spent in 1957-58 on Stage I of the scheme for the extension of the Southern Region electrification, covering the lines from Gillingham, Maidstone East and Sevenoaks to Sheerness, Margate, Ramsgate, Folkestone and Dover. It is expected that the work will be completed in 1962, but electric services will be introduced on some sections in 1959.

A scheme has been approved for the construction of five diesel-electric " de luxe " trains to operate between London and Manchester (London Midland Region); between London, Birmingham and Wolverhampton; and between London and Bristol (Western Region). These trains, which will be put into operation in 1958, will set new high standards of service for British Railways.

By the end of this year contracts totalling over £8 million will have been placed for signalling installations. Among major resignalling schemes, colour-light signalling is to be installed at St. Pancras at a cost of £294,000, and will be largely completed in 1958.

Detailed planning is now well advanced in connection with the extension, to be completed by 1962, of the standard system of automatic train control to five principal main-line routes: from London (King's Cross) via Newcastle to Edinburgh; London (Euston) to Glasgow (including Manchester and Liverpool); Edinburgh to Glasgow; London (Waterloo) to Bournemouth and Exeter; and London (Liverpool Street) to Norwich.

Signalling Contracts

The Westinghouse Brake & Signal Co., Ltd., has announced that, in preparation for the electrification of the Crewe to Manchester line, the London Midland Region of British Railways has placed an order with the company for the supply and installation of " Westatic " track circuiting equipment which has been specially developed to meet the requirements of this form of traction. The section from Wilmslow to Slade Lane Junction has been selected for this first installation, which entails the provision of 22 double-rail and 36 single-rail

track circuits, the general principle being to adopt the former for the berth tracks, up to 4,000ft in length, and the latter for the overlap tracks which do not exceed 1,800ft in length.

The Scottish Region has placed a contract with the Siemens and General Electric Railway Signal Co., Ltd., for signalling at Perth. This covers colour-light signalling and electro-pneumatic operation of points at Perth General station and extending over some nine miles of the main line. A route-relay interlocking installation operating over 400 routes will enable the work of thirteen existing signal cabins to be centralised in a new cabin south of the station, which will control the main line from Stanley Junction to Hilton Junction, respectively north and south of Perth, and the line to Dundee as far as Barnhill, a little over a mile from the General station.

DEBATE ON NUCLEAR STATEMENT

LORD MILLS, the Minister of Power, after making his statement on the expanded nuclear power programme last week, was closely questioned in the House of Lords about the costs involved and the proposal to accelerate the procedure for public inquiries.

Viscount Alexander of Hillsborough said the prospects for saving oil imports and coal were quite stupendous, but the reference to the heavy burdens that might have to be met by the public, both financial and "physical," was somewhat cryptic. Was this confined to interference with amenities, or would there be some difficulty in getting the raw material for the actual development of nuclear energy? With a project so vast, it would have been more reasonable to publish a White Paper, for debate in Parliament before putting down amendments to the Electricity Bill, giving information about the financial and physical resources available, and an indication of the impact of the programme on the national economy.

Lord Lawson asserted that a programme which would bring an industrial revolution greater than any we had experienced had been decided before Parliament had been consulted. Great disturbance was felt about the effect on amenities.

Atomic Exports

Viscount Hall asked whether the Government's programme was framed with the need for export trade in mind. He noticed that America had already received orders for nuclear power stations from various countries.

Lord Lucas of Chilworth asked if the capital cost, which would not be far short of £1,000 million, had been measured against other capital commitments such as the £1,200 million for the railways, and the 275 kV grid system. The most ominous part of the statement was the reference to the erection of overhead transmission lines in parts of the country which had not felt the impact of the nation's requirements for electricity. The Minister should see that far better machinery was set up to deal with legitimate complaints. He hoped that in inquiries about the siting of some of these atomic stations the Minister would not be judge in his own cause.

Lord Mills, in a long reply which much impressed the House, said that by material resources he had meant not only sites, but steel and other materials, and above all the brains of the scientists and engineers who would be engaged on the work. But he would not have put down a programme which seemed incapable of being carried out.

He had stressed the importance of coal because it was our fundamental wealth, but our energy requirements were growing so rapidly that we needed more coal, oil and nuclear energy. To meet world competition we must press on with mechanisation, which meant more power.

The nuclear power programme must remain flexible, subject to periodical review, therefore he doubted whether Parliament would want to have a White Paper every time there was a change. He could give only a rough estimate of the cost, because the Government would take advantage of any improvements and discoveries that were made, and they were hoping that as the programme proceeded costs would fall. The cost of generation at the three nuclear stations which had been ordered was expected to be very slightly more than at new conventional stations, but the operating cost was much lower. While conventional stations would go on improving in efficiency, the efficiency of nuclear stations would improve much more rapidly so that ultimately the cost of producing electricity from them would be less than from conventional stations.

The Government had measured the enormous capital cost against other capital requirements and they were deeply conscious of the need to look after amenities and protect the rights of individuals—all they were seeking to do was to speed up the procedure because in certain respects it was taking too long.

Viscount Alexander thanked the Minister for his answer and suggested that there might be a debate. The Marquess of Salisbury said the Government would agree to this.

In the House of Commons the Paymaster General (Mr. Maudling), replying to Mr. Robens, said the Government were satisfied that the technical resources would be available to carry out the full programme.

Mr. Geoffrey Lloyd, the former Minister of Fuel and Power, said the country would greet the statement with great satisfaction not only because of the trebling of the programme but because it carried with it the expansion of certain key parts of our economy in relation to atomic power: the making of nuclear graphite, the preparation of uranium and the fabrication of special steels which would make it possible to expand the programme much quicker than would otherwise have been possible.

Mr. Woodburn asked the Government to consider the conservation by pumped storage of power produced overnight, and Mr. Maudling, in reply, said that the question of pumped storage in relation to the base-load problem was very much in their minds.

Reactor Design

Asked by Mr. Warbey if the expanded programme was based entirely on the Calder Hall type of reactor, Mr. Maudling said that as far as they could see, in the present state of their knowledge, all the stations in this programme would be of the Calder Hall basic type, though with considerable improvements and modifications. On the question of cost, they had no reason to depart from the estimate given in the 1955 White Paper.

Mr. Palmer asked what special steps were being taken to ensure the supply of the necessary trained technologists and to see that they were paid properly.

Mr. Maudling said that recruitment was in the hands of the C.E.A. and the A.E.A., but the proposals of the Minister of Education for technical education generally were also very relevant.

Common Market Proposals

PROBLEMS FACING THE ELECTRICAL INDUSTRY

From a Special Correspondent

NOW that agreement has been reached by the six Messina powers* on the establishment of a Common Market in Europe, the British electrical industry, in common with industry generally, will need to do some hard thinking to find the right answers to the many problems the situation poses. A treaty is expected to be signed by the "six" in Rome towards the end of the month and ratified by the respective Governments later in the year. The broad principles underlying the plan for integration were outlined in the *Electrical Review* of 19th October last.

The probability that the six countries would eventually reach agreement on the Common Market proposals had been apparent for some time and the United Kingdom Government had defined, in advance of final agreement among the "six," the extent to which it was prepared to commit this country to association with the Common Market.† This association would extend to the granting, eventually, of duty-free entry of Common Market area goods into the United Kingdom in return for reciprocal treatment of British goods entering the Common Market area. One of the main objections to a complete tie-up with the Common Market is that the tariff of the United Kingdom would be replaced by a single common tariff with the other member countries against the rest of the world, including the Commonwealth, thus making it impossible to maintain Imperial Preference. If the Government's proposals are acceptable to the "six" the United Kingdom will be able to control its own tariff *vis-à-vis* third countries.

Indeed, these proposals follow fairly closely the findings of the working party, on which the United Kingdom was represented, set up by the Organisation for European Economic Co-operation, which was charged with studying "the possible forms and methods of association, on a multilateral basis, between the proposed Common Market and member countries not taking part therein." Among the O.E.E.C. countries also known to be studying the possibilities of associating themselves with the Common Market are Austria, Switzerland, Denmark, Norway and Sweden and, possibly, Portugal and Eire.

Originally, the possibility of association with the Common Market, so far as this country was concerned, envisaged a two-way channel of free trade between the United Kingdom and the Common Market. The adherence of one or more "peripheral" countries to the Common Market correspondingly increases the extent of the free trade area. For example, if the United Kingdom, Sweden and Switzerland decided to associate themselves with the Common Market then Sweden and Switzerland would both have to admit British goods, and each other's, into their respective territories on the same terms as Common Market goods, and the same treatment would apply, in reverse, in respect of Swedish and Swiss goods entering the United Kingdom. Assuming that all the O.E.E.C. countries elected to join the free trade area a vast market of some 250 million people would be created.

Definition of Origin

The problem which immediately presents itself is how the origin of goods which are to be entitled to benefit by the Common Market and free trade area arrangement is to be defined for customs purposes. In most cases the origin of a product (and electrical goods in general are not exceptional in this respect) can be fairly easily identified, but some goods will consist partly of free trade area products and partly of goods imported from third countries, especially such goods as component parts for incorporation in complete machines or assemblies. The rules must therefore ensure that the special tariff arrangements can be limited to goods which are genuinely the product of the area so that a common qualifying standard must be adopted, acceptable to all countries concerned, which will allow for "mixed" goods as described above, as well as goods wholly originating in the area, to qualify for preferential treatment.

So far as "mixed" goods are concerned, a specified minimum percentage of content or value which can be attributed to work or processing done, or material produced in the preferential area, must be determined. Commonwealth materials would not normally count towards the qualifying percentage but as so many of the European countries as well as the United Kingdom depend on imported raw materials for their manufacturing industries one obvious step is to press for the drawing up of an agreed list of materials which would qualify automatically for free trade area treatment.

"Unfair" Competition

The fear has often been expressed that, if Britain were to join the free trade area and accept the obligation to admit European goods into the country eventually free of duty, the gates would be opened to a flood of cheap foreign imports. "Cheap" in this context is generally taken to mean goods sold at prices below cost or at less than the home level; in other words goods which might fairly be termed to have been "dumped" or subsidised. When the present Customs Duties (Dumping and Subsidies) Bill now before Parliament becomes law, adequate protection should be afforded to United Kingdom manufacturers, at any rate in the home market.

Even without this protection the question may well be asked whether fears of "unfair" competition are altogether well founded. If the problem is looked at from the free trade area point of view—and on the assumption that a genuine element of competition is engendered within Europe—then the question could well be countered by asking for how long any manufacturer, receiving no element of protection in his home market, could afford to maintain a policy of dual pricing.

However, the proposed rules of the Common Market forbid unfair and discriminatory trade practices such as those described. One element of possible "unfair"

* France, Germany, Italy, Belgium, Holland and Luxembourg

† White Paper, Cmd. 72: "A European Free Trade Area" (H.M. Stationery Office, price 6d)

competition, which does not appear to be provided for, is that of granting long-term credits in respect of large contracts.

Standards and Approvals Regulations

Simultaneously with the fears voiced in regard to unfair competition is the very real apprehension that the absence of any legally enforceable standards or approval regulations in the United Kingdom may leave manufacturers open to competition from inferior or unsafe appliances. So far as the "plant" side of the industry is concerned the question of standards, as such, does not appear to set any real problem. Domestic appliances and similar types of user goods have to undergo stringent tests before they can be accepted on the Continent, whereas equivalent types of goods may be imported into the United Kingdom without being subjected to any kind of test or inspection at all.

Should a national testing house or some other competent authority be established in this country having power to enforce standards comparable with those recognised on the Continent? This again poses another problem; if the United Kingdom insists on Continental manufacturers complying with our standards this may have the effect of keeping out foreign goods but would do nothing to promote the export of British goods to the Continent. The obvious compromise would be the mutual acceptance of each other's standards, but in any event the question of standards generally is one which will need the most serious consideration.

Imperial Preference

Among the many arguments which have been advanced to support the contention that the United Kingdom should stay outside the proposed free trade area is that our future lies with the Commonwealth and that no action should be taken to prejudice the preferential tariff arrangements existing between the United Kingdom and other member nations. The trade returns show that about half of British electrical exports are absorbed by the Commonwealth, but how much of this trade can be attributed solely to tariff preferences?

The United Kingdom on the whole fares no more severely at the hands of Continental countries, where she receives no preference at all, than she does in many of the Dominions. Examples taken at random do not give a guide to the general level of any one country but this example is instructive: vacuum cleaners made in the United Kingdom pay duty at 25 per cent *ad valorem* when imported into Australia; in New Zealand the duty is also 25 per cent. In Germany and the Benelux countries, however, the rates of duty are, respectively, 10 per cent and 12 per cent. It is only fair to say that a wide range of British goods, mostly of a kind not made in the country of importation, enter the Dominions duty free, but so also do many classes of capital goods irrespective of the country of origin.

Electrical exporters will be aware of the many applications submitted by manufacturers in Australia, South Africa and New Zealand, for example, seeking increased tariff protection against British imports. Strangely, many of these applications are made by subsidiaries of British companies.

American Capital

Apprehension is also expressed that the establishment of a Common Market and free trade area, with a combined population of some 250 million people, might prove to be a great attraction to American capital for the purpose of setting up factories, both here and on the Continent, the products from which might come into competition with comparable British goods. But surely a capital-starved Europe would benefit from an infusion of productive capital, even from America, and what insuperable difficulty is there to prevent the enterprising British manufacturer from extending his own manufacturing activities to the Continent? So far as American capital investment in Europe generally is concerned, the United Kingdom has been the largest single recipient since the end of the first world war and no one could truthfully say that this has been to the country's disadvantage.

Disadvantages of Isolation

While the advantages to be gained by the electrical industry from the United Kingdom's association with the European Common Market and free trade area may not be immediately apparent, the disadvantages of remaining aloof are a little more clearly defined.

As already stated, the proposals in the Common Market plan allow for the substitution of a single external common tariff in place of the participating countries' individual tariffs. Taking Western Germany and three Benelux countries as a predominantly low tariff group, and France and Italy as a high tariff bloc, the ultimate level of the single common tariff is likely to be a compromise between the two, which means in effect that it will be higher than the average of the low tariff group. Since about one-half of total United Kingdom electrical exports to the Messina countries are absorbed by the three Benelux countries alone, the question must be asked whether this proportion and volume could be maintained in the face of higher tariffs.

Increased Economic Activity

Seeing that the primary objective of the Common Market is to increase the standard of living and the level of economic activity throughout Europe as a whole, it surely is a mistake to estimate future possibilities in the light of past performance. By isolating herself from Europe the United Kingdom, especially from the standpoint of the electrical manufacturing industry, would mean "handing on a plate," so to speak, virtually the whole of the Continental market to the German electrical industry. Not only would this help the Germans to build up and consolidate their hold on the European market but it would also increase their competitiveness in third country markets, including the Commonwealth.

Another compelling reason for not remaining outside the orbit of the free trade area is that the absence of the United Kingdom from the deliberations and discussions of the participating countries could well result in many decisions being taken that would react to our disadvantage. By playing our part and adding our weight to the negotiations as they progress we shall at least be taking some active step in the shaping of policy rather than being reduced to the role of passive spectators, powerless to influence the course of events.

Air and Water Pollution

THE Iron and Steel Engineers' Groups of the Iron and Steel Institute are to hold two special meetings later in the year at Church House, Westminster, S.W.1. A two-day meeting will be held on 25th and 26th September to discuss air pollution in the iron and steel industry, and on 11th and 12th December there will be a meeting to discuss water pollution. Particulars can be obtained from the Institute, 4, Grosvenor Gardens, London, S.W.1.

VIEWS on the NEWS

By REFLECTOR

A LEADERETTE, "Power and Paper Work," in the *Electrical Review* of 22nd February spoke of the intolerable burden of administrative work which power station superintendents were now required to bear. It was suggested that the remedy might be a reduction of the "paper" in which they were submerged. I now see from *Electricity* (the journal of the Central Electricity Authority) that the Divisional Secretaries have discussed this subject with a view to limiting the number of forms used by the different departments. Already action has been taken by some of the Divisions. As far back as 1952 the South Eastern Division set up a "Forms Committee" and as a result the number of forms in use has been reduced from 623 to 479. This still seems to me to be a formidable number of forms but I suppose they are necessary. A similar scrutiny made last year in the Midlands Division resulted in 51 forms of a total of 342 examined being abandoned, while a further 48 were amended.

* * *

"Contact," the magazine of the Bowthorpe Holdings group, mentions how difficult it is to get lights switched off when the staff is leaving the offices. In their case some improvement was noted until recently when it was seen that every light was on. Upon inquiry it was found that a cleaning company had been engaged to "do" the offices and its *modus operandi* was described as follows:—

> "Upon arrival at the offices the supervisor makes sure that all the lights are switched on but as each office was cleaned the lights in that office were turned off. In due course when all the lights were out the cleaning staff went home. Not a bad system if you don't have to pay the bill for electricity . . ."

* * *

One of the more recent E.D.A. films is entitled "How to Sell Your Husband a Washing Machine" and it shows Cicely Courtneidge inveigling her husband (Jack Hulbert) into an electricity showroom and making him "sign on the dotted line." It is an amusing film and it is also amusing to read in the *Evening News* that Miss Courtneidge and her husband are, with others, opening a "launderette" in Bognor Regis.

* * *

A correspondent in the district calls attention to the complex lighting scheme which has been evolved for the 600 yards of road between the A 10 road and Broxbourne Station, Hertfordshire. He says that at the intersection with the main road there is a sodium lamp (1956) and from there one travels 180 yards to where a mercury lamp hangs over the street; this dates from about 1947. Fully 210 yards separate this from a metal filament lamp on a steel standard of about 1939, and fifty yards further on at the corner of a lane there is a cast-iron lamp-post bearing a gas lamp with triple burners. From there, at 85 yards, there is another metal filament lamp, apparently temporary since it is on a wooden post erected in 1955, and only 40 yards from a short new concrete post with a sodium lamp erected in 1957 on a new bridge. After that the electric lamps of the railway station and its bridges take over the task of lighting the traveller through the history of illumination.

* * *

Are engineers in this country accorded the esteem to which their importance in modern life entitles them? The answer, of course, is "No." The engineer, thanks partly to the indiscriminate use of the term, is still regarded by most people as a kind of superior mechanic—a foreman type. It seems that the Russians have a better sense of values. Mr. P. E. Sleight, a member of the British delegation which studied technical education in the Soviet Union, is reported to have said that in Russia the engineer comes next to Ulanova in the public estimation. This is reflected in a practical way by the comparatively high rewards which engineers receive. No wonder the supply is meeting the demand.

* * *

What is good for Blackpool is apparently of no use to Leamington. In common with the seaside resort and other towns Leamington has had "illuminations." At a recent dinner a speaker said that he could not see what benefit they were deriving from "these dreadful things." The lights were entirely spoiling the character of the town and he thought that after "the fiasco of 1956" this was an ideal time to switch them off for good. The Mayor, who also spoke, was of a different opinion. He said that the illuminations attracted visitors and if the visitors did not come the town would be "a very dead and meaningless place"—which I consider to be a reflection upon the inhabitants. There seems to be no special significance in the fact that the dinner was arranged by the Leamington Priors Association for the Prosecution of Felons.

* * *

Eighty years ago the *Electrical Review* (15th March, 1877) reported that:—

> "Mr. Graham Bell, the inventor of what Sir William Thomson [afterwards Lord Kelvin] named 'the wonder of wonders' of telegraphic science, is making active progress with his Telephone, and accounts reach us from time to time of the advances which are being made in the construction of the apparatus. Mr. Bell delivered a lecture on the subject at Salem, Mass., on the evening of the 12th ult., and on the following morning one of the newspapers published in Boston, eighteen miles away, gave an account of the lecture, which had been received by telephone from the lecture-room. Not only was the voice of the reporter clearly recognised at Boston, but the receivers of the message are stated to have heard distinctly the applause of the audience."

ELECTRICITY BILL IN COMMITTEE

Rural Electrification Costs — Bulk Supply Tariffs — Special Agreements

THE House of Commons committee which is considering the Electricity Bill last week further discussed an Opposition amendment which would relieve the Area Boards of the expense of rural electrification in meeting the obligation imposed by Clause 10 to pay their way. A new Clause which would set up a national fund for meeting the expense of rural electrification was considered at the same time.

Mr. Du Cann said the South Western Board was by no means the one in the most difficult position. The greatest task faced the South Wales Board which had so far connected only about 33 per cent of its farms. This compared with the 51 per cent connected by the South Western Board. Others below the national average were the Merseyside and North Wales Board and the North Eastern Board. There were still 37 per cent of all farms yet to be connected. The cost of connection was bound to go up and direct assistance from the Exchequer would probably be the best method of helping the industry.

Mr. Warbey favoured a system of subsidy, but said he was happy to accept the Opposition's proposal which amounted to making a levy on the more favourably placed Area Boards to help those which were less favourably placed.

Mr. Idwal Jones considered that Parliament should not impose on the Area Boards the necessity of balancing their accounts, because a nationalised industry was set up essentially as a means of rendering a service. It was quite possible that rural electrification would never pay its way.

Mr. Robert Mathew pointed out that the South Western Board had unique difficulties, only 36 per cent of its consumption being industrial. He hoped that the principle behind the so-called Moretonhampstead agreement would not be abandoned. Mr. Hayman also stressed the difficulties in the South West and the importance of continuing rural electrification to improve conditions for farm workers.

Not Always Unremunerative

Mr. David Renton, Parliamentary Secretary, Ministry of Power, said that sometimes the discussion had given the impression that all rural electrification was unremunerative. That was not so. In fact much of it had the advantage of being an off-peak load. The Government had taken the view that each Board must stand on its own feet and that the duty to supply electricity to the rural areas should be no exception to that obligation. They did not consider that obligation inconsistent with the Electricity Act, 1947, which contained the important proviso "as far as practicable." An examination of the financial facts would show that it was, perhaps, even unnecessary for the South Western Board to have received the only subvention from central funds which had ever been paid within the industry since nationalisation. In 1953-54 it received a subvention of £250,000; in each of the last two years it had made a profit of £500,000 and it now had accumulated reserve funds of £800,000.

Nearly all the Boards had their special difficulties. In the North West there was the problem of the National Parks. London had a most acute problem: that of modernisation and reinforcement. The result was that the London overall electricity charge was 1·778d/kWh sold, compared with 1·655d for the South West. The Welsh Boards also had the problem of the mountains and numerous marginal land farms and smallholdings. As for the boundaries of the South Western Area, the Herbert Committee came to the conclusion that all the Area Boards were well balanced. If it should become necessary to change the boundaries that would be done, but there was certainly no necessity for it at the moment.

The C.E.A. had rightly enjoined upon the Area Boards the need for balancing their accounts. At 31st March, 1956, all the Boards were in credit after nine years' operation. The South of Scotland Electricity Board was financially sound in spite of acute problems in the hills, and was getting on with its rural connections without difficulty.

Allocation of Central Reserve Funds

Already there was considerable subsidisation to rural consumers because the cost of main distribution lines in each area was charged to all the consumers in the area, and all domestic consumers, whether urban or rural, paid the same domestic tariff. With these two advantages in mind the Government offered a further measure of comfort; they had decided that when the central reserve funds of the C.E.A., amounting to £14 million, were divided among the Boards the Minister's approval would be required for the scheme to be put forward by the Electricity Council. The Council would be expected to give special consideration to those Boards with particular difficulties, including those arising from rural electrification. A minor amendment to Schedule II would be necessary to put this proposal into effect. The share of the central reserve fund should carry any Board which had a difficult electrification programme over any difficulty it was likely to face.

Mr. Palmer referred to a statement by the Minister of Power in the House of Lords on 19th February that he would not dissent from the contention that in general the cost of rural electrification should fall on the whole body of consumers and asked whether Mr. Maudling and Mr. Renton agreed with the Minister.

Mr. Renton said that if the statement was examined in its context Mr. Palmer would find that it did not bear the interpretation which he attempted to put on it. The Minister in no sense supported the proposal put forward by the Opposition in the new Clause.

Mr. Palmer said that as to the accuracy of the quotation in its context he would leave to members to judge. Although Conservative members had spoken in favour of a direct Exchequer subsidy it was clear that there was no prospect of its being given. The question therefore arose: What was the supply industry to do at the present time?

Mr. Nabarro said that under the new long-term farm guarantees 33⅓ per cent of the cost of power installations on farms would be provided by direct Exchequer grant.

Mr. Palmer observed that that kind of assistance would not help rural dwellers in general. The obvious and practical thing to do was to carry on with the principles of the now-famous Moretonhampstead agreement. It

seemed obvious that the Government intended to end it.

Mr. Renton said there was no intention of doing that. From the way the first five-year programme had gone, the Government felt there was no reason to doubt that this scheme would be fulfilled. This internal scheme was the industry's way of interpreting the wishes of Parliament.

The amendment was negatived by 19 votes to 15.

On the question that Clause 10 should stand part of the Bill, Vice-Admiral John Hughes Hallett asked whether money for the expansion of the industry fell within the category of things " properly chargeable to revenue."

Mr. Maudling said the Clause stated that the Area Boards should so perform their functions as to secure that the revenues were not less than sufficient to meet the outgoings. It said nothing about their being " not more than sufficient " so it put no limitation on the degree to which they could exceed what was needed to meet the outgoings.

Clause 10 was approved.

Bulk Supply Tariff Variations

On Clause 11 (" Tariffs ") Mr. Palmer moved an amendment to give the Generating Board, in consultation with the Electricity Council, a free hand in fixing its tariffs. The amendment deleted the passage stating that different tariffs might be fixed for different Area Boards, provided that the Generating Board, as far as practicable, secured that the differences in prices corresponded with the differences in the cost to the Generating Board of supplying electricity in bulk to those Area Boards respectively. He could not understand why these complicated words should be in the Bill, but thought they were a reflection of undue discrimination.

The danger inherent in the words which he proposed should be left out was that they tended to describe the kind of principles to be followed in fixing the bulk supply tariff. Perhaps the thought in the mind of the drafter was that he should give some kind of allegiance to the principle of avoiding undue discrimination which was known in relation to retail tariffs, but this was not appropriate to bulk supply tariffs.

Mr. Renton, Parliamentary Secretary, Ministry of Power, said that the Government wished to give the Generating Board the greatest possible flexibility and freedom, therefore they agreed that the paragraph setting out the principles on which the Board might fix bulk supply tariffs should be deleted.

Mr. Palmer's amendment to this effect was agreed to.

Mr. Hobson moved an amendment to Clause 11 (2) to ensure that the Electricity Council's approval would be needed in the fixing of prices to be charged by Area Boards for the supply of electricity to the railways.

Mr. Renton, in reply, said he did not think the possibility of Area Boards supplying electricity direct to the railways was contemplated. It was true they had the right to do it, but the Government had made it plain that their powers were intended for exercise only in exceptional circumstances and on a small scale.

The amendment was negatived by 17 votes to 12.

Special Agreements

Mr. Fort moved an amendment to provide that in the event of an Area Board unreasonably refusing to enter into a special agreement with a customer for supplies for which the standard tariffs were not appropriate, the matter could be referred by the customer to the Electricity Council. Thereafter the Council could give such advice as it thought fit to the Area Board concerned. He said he moved the amendment to meet the situation which had arisen from the House of Lords' decision in the case of the British Oxygen Co. v. the South West Scotland Electricity Board in which the company argued that undue preference or undue discrimination would be shown by the Area Boards if they did not take into account the difference in costs involved in supplying very large consumers such as they were.

Mr. Renton said Mr. Fort had pointed out a gap which would be created by the repeal of parts of the 1947 Act relating to special agreements. Unless something was put into the Bill there would be no remedy for those who entered into special agreements in the event of dispute. The Government accepted the principle of the amendment but as this was a legal problem they would put down their own amendment for the Report Stage to cover this point.

Sir Frank Soskice said the Government appeared to be going some way to meeting the case put forward by the Opposition on the last amendment. They should put some obligation on the Area Boards to act upon the advice given by the Council about tariffs, otherwise the Government were conceding nothing to Mr. Fort.

Mr. Renton said the object was to put a specific obligation on the Council to consider any dispute about special agreements, otherwise there might be some doubt whether they could do so. The idea was that they should give specific advice to the Area Boards for them to act upon.

The amendment was withdrawn.

On the motion that Clause 11 should stand part of the Bill, Mr. Warbey asked how the Minister of Power would intervene in the case of disputes, and if the Generating Board operated a high tariff policy.

Mr. Renton said that the existing procedure whereby the Minister approved the principles of the tariff policy would continue. But the most important safeguard would be that provided by a new Clause which the Government would move later. This would give the Council the power to consider disputes between the Boards—including disputes on bulk supply tariffs—and if any dispute was not successfully resolved by the Council the Clause provided that it should be sent to the Minister for decision.

Flexibility Needed

Mr. Palmer said that the Herbert Committee had stated that the ideal tariff should be related to the true cost of energy, but if that had been the practice of the electricity supply industry from the beginning it would not have developed into the successful organisation it was now. A certain flexibility must be given; occasionally one group of consumers must of necessity temporarily subsidise another group. He hoped Parliament would not restrict promotional advertising too much. If the industry was to build its load and attract customers to one type of apparatus as against another in order to improve the load factor it must have the advantage of being able to put its case to the public on commercial lines.

The Clause was ordered to stand part of the Bill.

On Clause 12 (" Borrowing Powers of Electricity Council, Generating Board and Area Boards "), Mr. Palmer said it appeared to limit the borrowing powers to £1,400 million and he wondered whether this would be enough in view of the expanded nuclear energy programme.

Mr. Maudling said this was dealt with in the Money Resolution but he could give an assurance that the Government had in mind the amount involved in the new programme.

Lord Hinchingbrooke said that at the report stage he

and some other Conservatives would put down amendments that would enable the Generating and Area Boards —with or without the consent of the Minister of Power or the approval of the Treasury—to borrow money by the issue of electricity stock, and would withdraw Treasury guarantees from all future financing.

Sir Frank Soskice declared that the Government should resist this attempt to foist a further increase in cost of living upon the ordinary consumer.

Mr. R. Maudling, the Paymaster General, said it was his present intention, and that of the Government, to propose that the Clauses dealing with the financing of the industry should be added to the Bill. At the Report Stage he would be interested to see the proposed amendments but until they were moved he could not comment upon them.

The Clause was approved.

Tax Liability

On Clause 15 (" Estimates of Boards' Requirements and Allocations to Them of Liabilities in Respect of Stock "), Mr. Renton moved an amendment which would ensure that for profits tax and income tax purposes the assessment would be made on the industry as a whole in the name of the Electricity Council, and that the Council would be enabled, by a levy on the Generating Board and the Area Boards, to recoup itself. The purpose was solely that of simplification.

The amendment was agreed to.

On the motion that the Clause stand part of the Bill, Mr. Renton, in reply to Mr. Warbey, gave an account of how financial requirements would be settled. He said that first the general plans of the Boards would be settled with the Minister, the Electricity Council having some knowledge of the arrangements because they would have considered them before they went to the Minister. Then each Board would put in its application for capital requirements to the Council, giving such information as was necessary to show why capital was needed. The Boards, no doubt having considered what global sum was likely to be arrived at, would consider how most fairly it could be divided among themselves.

The Clause was ordered to stand part of the Bill.

On Clause 16 (" Central Guarantee Fund ") Mr. Palmer called attention to a section which provided that in the event of a Board defaulting the Council could put in commissioners to take over the management and asked what kind of balance there was to be between the individual reserves of the Boards and the Council's central guarantee fund.

Mr. Renton said that each of the Area Boards, in proportion to the amount of stock from which it benefited, would be required to contribute to the central guarantee fund, which was not for any other purpose than to meet interest and the redemption of stock. This was the only exception to the good rule that the Electricity Council should have no executive functions. Its power was, broadly, analogous with the power to foreclose on a mortgage.

The Clause was agreed to.

On Clause 18, the Committee approved a Government amendment giving the Electricity Council a general power to levy contributions from the Boards, and make payments in respect of compensation to members and officers of the present C.E.A. who might be affected by the reorganisation, payments of income and profits tax, and payments of compensation to local authorities for the nationalisation of their undertakings.

The Clause, as amended, was agreed to.

On Clause 19 (" Application of Surplus Revenues of Electricity Boards "), Mr. Palmer referred to the Herbert Committee's suggestion that beyond certain levels the industry should not build up reserves for financing its own expansion because to do so would be to impose a compulsory saving on present electricity users for the benefit of future consumers. He had always thought that this was curious reasoning. The Government should say whether they proposed to adjust their control to induce Boards to finance more of their developments from reserves.

The Committee adjourned.

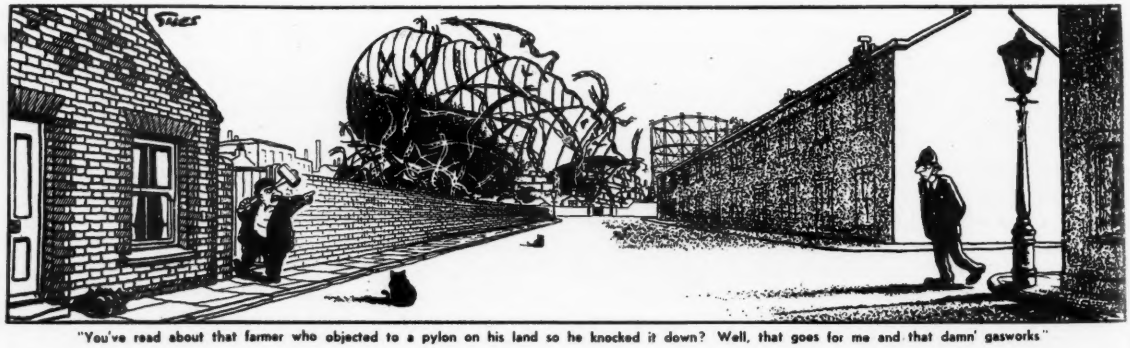
New Clauses

The Government has tabled two new Clauses for the Bill, one to speed up road building procedure in connection with electricity works and the other to give Electricity Boards power to enter and survey land to ascertain whether it would be suitable for their purposes.

Engineering Wages Claim

ON Tuesday last the Engineering and Allied Employers' National Federation again rejected the engineering trade unions' claim for a 10 per cent increase in wages. Their case was that wages must not be allowed to outrun productivity or add to the cost of exports, especially as Great Britain's share of world trade was decreasing.

After the meeting Mr. W. J. Carron, the chief spokesman for the unions, said that his side had intimated to the employers that the feeling among the unions' members was such that they could see nothing other than a major strike in the engineering industries.



"You've read about that farmer who objected to a pylon on his land so he knocked it down? Well, that goes for me and that damn' gasworks"

[Reproduced by courtesy of the Sunday Express

INDUSTRY AND THE HOUSE

Points from the Committee Debate on the Electricity Bill

By A. M. F. PALMER, A.M.I.E.E., M.Inst.F., M.P.

THE Paymaster General, Mr. Maudling, has proved himself an able pilot of the Electricity Bill in spite of coming to his task in midstream so to speak. He has grasped in no time the essentials and is wise enough to leave profounder argument alone both in the interests of his reputation and brevity of speech. If anyone on the Government side is inclined to push off into deeper waters it is Mr. David Renton, the Parliamentary Secretary, always risking a forensic torpedo from the agile brain of Sir Frank Soskice. The former Attorney General is an unerring marksman. Sophistry is sunk without trace when he opens fire.

Gas Industry as a Model

Listening to the Government's defence of the Bill's proposed structure for reformed electricity supply, I have been taken by an unusual curiosity to know more of this new paradise, the gas industry. In that happy land since nationalisation all apparently has been milk and honey, or at least lemonade and biscuits. Anyhow the Government's view apparently is that everything has worked out well with Mr. Therm and electricity will have the same arrangement and like it. True, they were prepared to bend a trifle on the composition of the Electricity Council —a little more for generation and stronger Ministerial representation—but not an inch was conceded on powers or rather lack of powers.

From the Labour Opposition we put forward a series of amendments which were designed to give the Council a limited number of defined tasks to carry out on behalf of the industry as a whole; responsibility for the bulk supply tariff and capital control for instance. Our aim was to find a sensible mid-position between the reserved powers system of the Herbert Committee and the extreme confederalism of the Government's scheme. To the compelling argument (to the writer at any rate) that without change effective power will go in the long run to the Minister and his civil servants, Messrs. Maudling and Renton give only the reply that lions will consort with lambs and nobody will be gobbled up. Everybody is too nice for unprincipled behaviour of that kind we are told.

Rural Electrification Clash

If debate on the Council's powers has been calm and sustained, sharper clashes occurred earlier over the right of the Boards to manufacture and, more recently, over rural electrification. To cover the still remaining obligation of the nationalised industry to develop rural supplies the Opposition proposed a special national fund, financed by the industry as a whole, to help out Boards with special rural problems. The intention was to dovetail this to the existing " Moretonhampstead " understanding which provides for progress in rural electrification to be measured at five-year intervals. Any Board which can show then that because of a progressive attitude to rural supplies it is " in the red " will be reimbursed.

Our scouts brought news that the new Clause embracing our scheme had been hailed in the South West, in particular, with joy and local newspapers there carried stories of Members supporting the Government pressing the Minister not to put them in a difficulty by seeming to be less concerned than the Opposition about taking electricity over hill and dale. The truth or otherwise of this is for conjecture but when the Standing Committee moved sooner than was anticipated on to the issue (because of the " paving " amendments) then the care of some Conservative country Members to keep right with their constituents became evident. Yet at the division the Government registered a solid vote. Over this I reproach nobody for if assurances save blushes then Mr. Renton was very lavish with them. He also found an extract from the T.U.C. evidence to the Herbert Committee with which to embarrass Labour. This was to the effect that the T.U.C. were against urban consumers subsidising rural consumers; they thought subsidies should come, if needed, out of general taxation. As a theory this has much to recommend it but the fact is that if the present pace of rural electrification is to be maintained then with the Government's approach a *limited number* of urban consumers will shoulder the full burden. With the special fund idea *all* urban consumers would have done their share in a very small way.

Commercial Accountability

Throughout Ministers have stuck stubbornly to the view that Area Boards should adhere for the future to " commercial " accountability and pay their way " taking one year with another." From this general principle the Labour side of the Committee does not dissent but considers that rural electrification is a special case which like bulk supply charges has more than a small bearing on the relative fortunes of the Boards. The future of rural electrification is certainly not as clear as it seemed to be three years ago.

The joint consultation issue however is probably resolved. After an informed debate Mr. Maudling said he had been impressed by the strength of trade union opinion about the need to maintain the national principle and would make a constructive suggestion before the Report Stage. He accepted without reservation minor amendments dealing with new schemes of joint consultation and for education and training to be brought in with everything else.

At the tenth sitting of the Committee when good progress was made with the less controversial middle Clauses, dealing in the main with finance and stock issues, the smooth advance of our work was broken by an unexpected intervention. Lord Hinchingbrooke, adding to his considerable inches by rising from the highest benches, announced that on Report he would lead other Conservative back benchers in tabling amendments to eliminate the Treasury guarantee from the future financing of the industry. The Paymaster General, whatever his inner feelings, outwardly took this ultimatum with great calm. In spite of repeated demands from the Opposition that he give a firm answer to the challenge at once, Mr. Maudling persisted in saying he must wait until the threatened amendments were reached. Why Report Stage? I think the answer is that the rebels

want the maximum publicity for their foray. Report is taken on the floor of the House and not in the relative seclusion of Committee upstairs.

On the whole the House received the news—long awaited—of the extension to the nuclear power programme very well. Mr. Robens asked, very reasonably I thought, that a White Paper setting out all figures be issued and maybe this will be done in the end. The big question is, has the country the human and material resources to carry the job through?

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Home-Made Electrical Apparatus

I HAVE noted Mr. G. H. Cook's remarks on this subject in your issue of 1st March, but would have found myself more in agreement with his comments if he had not used the term "amateur." I do wish he—and "Reflector" too—would use a word which accurately describes the type of person he has in mind. I am certain Mr. Cook is concerned with inexperienced people who do the sort of thing he mentions; he could refer to them as "inexperienced amateurs" but I think a better description of such is "novices." It is incorrect to refer to them as "amateur" because an amateur is one who does or makes something but not for the prime purpose of earning a living. The professional does it for sake of reward, and the amateur may or may not be experienced.

Mr. Cook goes on to refer to the "electrifying" of a lawn mower but I am not very clear as to what he takes great exception to. If it is because some people have gone in for this particular pastime, I suggest that one reason is the high cost of new electrically driven mowers. One can hardly be surprised at a person who owns a hand-propelled mower, which costs something between £5 and £10, looking at the price of a new electric type, costing to-day £40 or more, and then wondering if he could add an electric motor to his existing machine.

Some of Mr. Cook's strictures might be passed on to the (professional) makers of electric drills, etc., who eagerly encourage the amateur to buy attachments and go in for such outdoor jobs as hedge cutting, paint and creosote spraying, etc. Little or nothing is said about the risks attached to such pursuits—the desirability of using 110 V (or less) equipment, the employment of an isolating transformer, etc.

I am not at all ashamed to be called, among other things, an amateur painter. My activities in this direction, like those of house owners to-day, go far beyond the painting of a kitchen door, and what's more the results usually compare more than favourably with the professional's work.

Upper Nazeing, Essex. T. L. FRANKLIN.

Hydro-Electric Peaks

I REFER to the letter from Mr. D. Purves which appeared in your issue of 15th February. The figure of 800 MW given in my article of 28th December is the total capacity for the whole of the Hydro Board's system, and so includes all the plants in the areas which are not connected to the main grid system. The load curve shown in Fig. 1 may be taken as fairly typical of the conditions in the winter of 1955-56 on the Hydro Board interconnected grid system only. From the installed plant, totalling 800 MW, there is also to be met the export under contract to the South.

The best way of answering the point raised in the second paragraph is to give the contribution of hydro plant to meeting the total load in Scotland. Typical maximum winter week-day generated loads on the combined Scottish grid system have been about 1,750 MW. The amount of this supplied from hydro has been about 670 MW.

Further hydro schemes are being developed and others actively surveyed. There should be a future for pumped storage schemes for peak load supply, especially when more base load nuclear plant is installed in the country. These schemes would be very much larger than the straight hydro schemes constructed so far.

Edinburgh. C. L. C. ALLAN.

World Power Conference, Belgrade

COPIES of the general programme for the sectional meeting of the World Power Conference to be held in Belgrade from 5th to 11th June are now obtainable from the secretary of the British National Committee, 201-2, Grand Buildings, Trafalgar Square, London, W.C.2, through whom membership applications must be submitted for receipt by the Yugoslav National Committee by 1st April, though earlier notification is desirable. Application forms for membership and for participation in excursions and post-conference tours are contained in the general programme.

British participants to date include the following names. Sir Harold Hartley (president, W.P.C., 1950-56, and now hon. chairman of the International Executive Council, official delegate representing H.M. Government), Sir Vincent de Ferranti (chairman of the International Executive Council and of the British National Committee), Lord Citrine (chairman, Central Electricity Authority), Sir John Hacking (Merz & McLellan, vice-chairman, B.N.C.); Dr. A. Parker (lately Director of Fuel Research, D.S.I.R., hon. sec. B.N.C.), Dr. G. H. Daniel (Ministry of Power), Dr. H. S. Arms (English Electric, Babcock & Wilcox and Taylor Woodrow Atomic Power Group), Messrs. J. C. Duckworth (C.E.A.), R. Y. Sanders (C.E.A.), M. E. Hubbard (British Petroleum Co.), J. A. Jukes (Atomic Energy Authority), E. W. Golding (Electrical Research Association), G. Cook (Simon-Carves), J. K. Hunter (Sir Alexander Gibb & Partners), A. N. Vassilissin (English Electric Co.), G. B. R. Feilden (Ruston & Hornsby), S. A. Ghalib (A.E.I.-John Thompson Nuclear Energy Co.), C. A. Cameron Brown (C.E.A.), R. W. Mountain (Kennedy & Donkin), A. N. Irens (South Western Electricity Board), L. Howles (S. Wales Electricity Board), T. Coates (North Western Electricity Board), A. N. Todd (London Electricity Board), W. C. Parker (C.E.A.), J. P. Elphick (C.E.A.) and C. H. Gray (secretary, International Executive Council, W.P.C.).

A list of papers having an electrical bearing by British authors on the main theme of the conference "Power as a Factor of Development of Underdeveloped Countries" was given in the *Electrical Review* of 18th January.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

As we go to press we learn that the Council of the British Electrical Development Association has chosen **Mr. J. I. Bernard,** B.Sc.Tech., M.I.E.E., chief technical officer of the Association, to succeed **Mr. Victor W. Dale,** Companion I.E.E., as director and secretary of E.D.A.

Sir Edwin Plowden, chairman of the United Kingdom Atomic Energy Authority, is leaving to-day (Friday) for a visit to South Africa as guest of the South African Government. The purpose of his visit is to meet those concerned in South Africa with atomic energy development, and in particular with the mining of uranium.

Troughton & Young, Ltd., announce that the following appointments have been made recently in the company and its subsidiaries:—**Mr. M. C. Pateman,** Associate I.E.E., to be a technical director of Troughton & Young, Ltd. **Mr. C. J. Misselbrook,** B.Sc.(Eng.), F.I.E.S., to be a technical director of Troughton & Young (Lighting), Ltd. **Mr. R. D. Jackson** to be a technical director of Tyrad Electric, Ltd. In addition, **Mr. P. E. M. Sharp,** A.C.G.I., B.Sc.(Eng.), A.M.I.E.E., has joined the company as personal assistant to Mr. A. H. Young, joint managing director.

The Eastern Division, C.E.A., announces that **Mr. A. C. D. Barwick,** A.M.I.E.E., maintenance engineer (electrical), Rye House generating station, has been appointed deputy station superintendent, South Denes, as from 1st April. Mr. Barwick commenced his service in the industry with the Norwich Corporation Electricity Department in 1937, being appointed a shift charge engineer at Norwich generating station in 1949, and to his present position at Rye House in 1955.

Mr. A. C. D. Barwick

Mr. E. R. Kebbell, A.M.I.E.E., A.M.I.I.A., has been appointed district commercial engineer of the Hastings District, East Sussex and South West Kent Sub-Area, South Eastern Electricity Board. His training was obtained with the Norwich Corporation Electricity Department, which he left shortly after the outbreak of war to take a position in the Electrical Engineering Department of the Admiralty at Bath. Since resigning from the Admiralty in 1951 Mr. Kebbell has been first assistant district commercial engineer at Hastings.

Mr. E. G. Long has been appointed the new Bristol area superintendent of the A.E.I. Lamp and Lighting Co., Ltd. He has been connected with the electrical trade in the Bristol area for many years, joining the B.T.H. Co.'s Bristol branch in 1924 as a member of the showroom staff and entering the Lamp Department in 1929. In 1936 he was appointed lamp and lighting sales representative for the Bristol area.

[Mr. E. G. Long

Mr. R. Cook, B.A.(Admin.), A.I.M.T.A., A.S.A.A., has been appointed deputy chief accountant of the Midlands Electricity Board. Mr. Cook spent the early part of his life in Lancashire and was educated at Rochdale High School and Manchester University, later serving with Manchester Corporation. After war service, during which he attained the rank of captain, he became, in 1947, an assistant in the Borough Treasurer's Department at West Bromwich, and in 1949 was appointed chief internal auditor to York Corporation. He joined the accounting staff at the headquarters of the Midlands Electricity Board as a principal assistant three years later.

Mr. A. V. Summers (chairman) and **Mr. V. R. Summers** (managing director) of Milliwatt, Ltd., sailed on 8th March on the R.M.S. *Andes* on a business trip to South America.

Mr. Freidl Hanebeck, consultant electrical and mechanical engineer, has joined the headquarters specialist staff of Camp Bird Industries, Ltd. Mr. Hanebeck, a Swiss who graduated from Vienna University and received much of his training in the design department of Brown-Boveri, has worked in this country for nearly twenty years. His main duties with Camp Bird will be to assist in the development of new electrical and electronic projects, particularly in the field of small electric motors.

At the annual meeting of the **Institution of Electronics** held in London on 2nd March, Mr. J. F. G. Craig was elected chairman of the Council, Mr. W. Birtwistle, hon. general secretary, and Dr. L. E. C. Hughes, hon. treasurer. The headquarters of the Institution are now at 78, Shaw Road, Rochdale, Lancs. The former headquarters at 20, Buckingham Street, Strand, London, W.C.2, are retained as the headquarters of the London Division.

Mr. K. B. Blake, B.Sc.(Eng.), A.M.I.E.E., has joined the staff of the Electric Construction Co., Ltd. He will be dealing with special projects and his address will be at the company's offices for the Southern Counties at Bushbury House, 57, Buckingham Gate, London, S.W.1 (telephone: Victoria 3482/3). Mr. Blake was formerly with the Nevelin Electric Co., Ltd., and with the Metropolitan-Vickers Electrical Co., Ltd.

Mr. R. J. Halsey, C.M.G., B.Sc., D.I.C., M.I.E.E., assistant engineer-in-chief of the G.P.O., has had the Fellowship of the City and Guilds of London Institute (F.C.G.I.) conferred upon him.

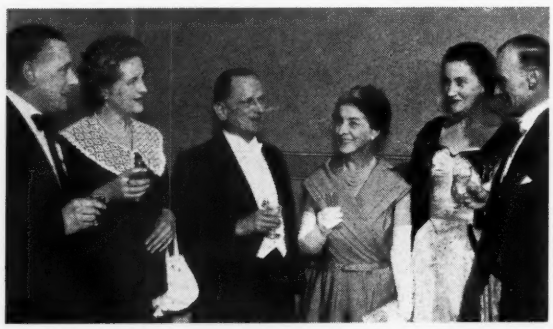
Some 180 members and friends attended the annual dinner and dance of the South West London Branch of the **Association of Supervising Electrical Engineers** held at the Wimbledon Hill Hotel on 22nd February. The toast of the Association was proposed by Mr. G. Kitchener, Mr. H. E. J. Butler, national chairman, responding. Mr. N. C. Harding, Branch chairman, proposed the toast of the guests, and Sir Harold Bishop, president of the Association, responded and praised the Branch for its fine achievements.

In recognition of his fifty years' service with Wolf Electric Tools, Ltd., **Mr. H. Richards,** chairman and joint

Mr. G. Wolfe presenting Mr. H. Richards with a tape recorder in recognition of his fifty years' service with Wolf Electric Tools

managing director, was presented with a tape recorder and silver cigar box at a celebration held at Coventry Street Corner House, London, W.1. The tape recorder was presented by Mr. Geoffrey Wolfe on behalf of the company, and the cigar box by Miss P. Perkins on behalf of the employees, of whom more than 500 per present.

Mr. D. Besley has been appointed manager of the Glasgow branch of Brown Brothers, Ltd. He joined the company in 1938 and has been manager of the Belfast branch since 1953. The company has appointed **Mr. A. V. Reid** as manager of the Belfast branch. He has been assistant branch manager since April, 1956. **Mr. T. Dawson** has been appointed assistant branch manager, Belfast. **Mr. J. C. Harwell,** M.A., LL.D., has been appointed assistant manager, Newcastle branch, and **Mr. F. A. Dunmore** becomes assistant manager, National Department, Head Office.



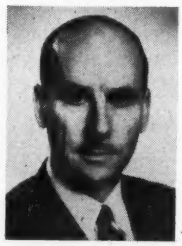
At the recent ladies' evening of the North Western Branch of the Electrical Trades' Commercial Travellers' Association held at the Alma Lodge Hotel, Stockport. Left to right: Mr. W. W. Blears (vice-chairman), Mrs. Blears, Mr. J. B. Jones (Branch chairman), Miss M. Riley, Mrs. Simons, Mr.F. J. E. Simons (national chairman)

To fill the vacancy created by the resignation of Mr. E. H. Pugh, **Mr. S. R. Hopkins** has been appointed commercial officer of the Coventry and District Sub-Area of the East Midlands Electricity Board. Mr. Hopkins, who was previously senior assistant commercial officer, has been at Coventry since 1929.

At a dinner held at the Hotel Majestic, Harrogate, on 6th March, Mr. H. G. Campbell, joint managing director of the **Benjamin Electric, Ltd.,** presented Mr. L. E. E. Langdon with an inscribed gold wristwatch as the award of merit for sales engineers of the company for 1955-56. Among those who attended were Mr. A. E. Iliffe, director and general sales manager, the area manager and sales engineers in the northern area, together with others from the head office in London.

At a dinner-dance at the Parkway Hotel, Leeds, on 9th March, Mr. E. H. Blackburn, of Dewsbury, chairman of the West Yorkshire Branch of the **Electrical Contractors' Association,** handed a cheque for £250 to Mr. Mervyn Ellis, a representative of the Electrical Industries Benevolent Association's West Yorkshire Branch. This money was raised at the annual dinner-dance held in Harrogate in January.

The General Electric Co., Ltd., has appointed **Mr. S. E. Mason,** formerly Osram departmental manager at Newcastle, as manager of its Hull Branch, in succession to **Mr. P. L. P. Thomas** who has become assistant district manager, Midland area. **Mr. J. S. Hemmons** has been transferred from the Osram Department, head office, to the management of the Osram Department, Newcastle.



Mr. S. E. Mason

Mr. Mason joined the circuit-breaker design office at the company's Witton Works, Birmingham, in 1929, after serving four years with the Westinghouse Electrical & Manufacturing Co. in the United States. In 1937 he transferred to the Newcastle Branch as manager of the Switchgear and Small Motor Departments. After war service with the Royal Artillery and R.E.M.E. Mr. Mason returned to the industrial sales section at Newcastle in 1945. He was appointed manager of the Osram Department, Newcastle, in 1950.

Long-service certificates were recently presented to members of the staff of **Partridge, Wilson & Co., Ltd.,** by Mr. H. G. A. Ross-Wilson, chairman and managing director, at the annual staff dinner. The recipients, who have served the company for twenty-five years, were Mr. J. Annandale (general sales manager), Mr. S. G. Dove (manager, standard sales), Mr. H. J. Lea (manager, transformer sales) and Mr. L. F. Wood (assistant works manager).

Mr. H. G. A. Ross-Wilson presenting a long-service certificate to Mr. J. Annandale. The others are (left to right) : Messrs. S. G. Dove, H. J. Lea and L. F. Wood

About 140 members of the Bradford Branch of the **Electrical Contractors' Association** attended the annual dinner at the Bankfield Hotel, Bingley, on 8th March. The chief guests were the Lord Mayor of Bradford (Ald. H. R. Walker) and the Mayor of Keighley (Ald. J. A. Taylor) who both paid tribute to the contribution the electrical industry was making towards the development of the country. The Lord Mayor of Bradford, proposing a toast to the Association, said the electrical contractors were doing a splendid job. The measure of reliance placed on the industry was shown by the fact that during the past year Bradford Corporation had placed £55,000 worth of contracts, ranging from £60 to £17,000. Mr. Gordon Binns, chairman of the Branch, responded. A toast to the towns and trades of Bradford, Keighley and Pudsey was proposed by Mr. A. S. R. Pratt (a member of the Council of the Electrical Contractors' Association), the Mayor of Keighley responding.

Mr. B. K. Cooper, author of the article on "Railway Signalling" (page 463), was educated at Aldenham School and University College, London. He entered technical journalism on the staff of the *Railway Gazette* and remained with the journal until the outbreak of war in 1939. During the war years he served in the Signals Branch of the R.A.F. and was attached for a time to the Ministry of Aircraft Production for editorial work on Air Ministry publications dealing with radio equipment. On returning to the *Railway Gazette* in 1945 he took charge of the electric traction section of the paper and was later appointed assistant editor. Subsequently Mr. Cooper joined the Press office of the General

Mr. B. K. Cooper

Electric Co., Ltd., and became technical editor of the *G.E.C. Journal* last year. He has written two books on railways with special reference to electric motive power and signalling.

Mr. K. R. H. Glass has been appointed deputy manager of the Leeds depot of the Simplex Electric Co., Ltd. Previously Mr. Glass was northern area "Creda" sales engineer and will continue to operate under the general direction of Mr. I. M. Cameron, manager for the northern area. Before joining the Simplex Electric Co. he was employed as an assistant commercial engineer of the Yorkshire Electricity Board, No. 4 Sub-Area. He served his apprenticeship with Taunton Corporation Electricity Department, and spent a number of years in various capacities with the Midland Electric Light & Power Co., Worcester Corporation Electricity Department and the Cambridge Electric Supply Co.

Mr. K. R. H. Glass

At last Tuesday's luncheon of the **Electrical Industries Club** the speaker was Mr. Ivor Williams (G.E.C.) who gave his impressions of the Caribbean area, stressing the importance of these territories in the British Commonwealth. Mr. Leslie Gamage, who was in the chair, announced that this was his last appearance as president and that his successor was Mr. A. F. Plummer, a past-president of the Electrical Contractors' Association. Mr. Gamage also reminded the members that the next luncheon would take place on 2nd April after the annual general meeting at 11.45 a.m.

The annual luncheon of the **Electrical Sign Manufacturers' Association,** at which the prizes for the second illuminated sign design competition were presented, was held on Tuesday last at the Savoy Hotel, London, Mr. F. F. Newlands, chairman of the Association, presiding.

Lord Luke, president of the Advertising Association, who proposed the toast of the E.S.M.A., and was one of the judges of the design competition, congratulated those who took part on their designs. He said that the competition showed the effort which was being made in design. The public wanted designs which were harmonious and simple. Nothing was worse than bad advertising and nothing did this country more harm than bad publicity.

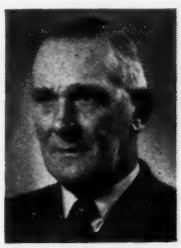
Mr. Newlands, in responding, referred to the role of the Ministry of Housing and Local Government in the formulation of the advertising regulations. He said that the Ministry was at present considering amendments to the regulations and the Association would give it every assistance. He thanked the judges of the design competition. Lord Luke then presented the prizes (the names of the winners were given in our last issue).

The toast of the guests was proposed by Mr. A. E. Beadnell, a past chairman of the Association. Sir George Pepler, in reply, suggested that sign manufacturers and architects should get together before building commenced; it was important that illuminated signs should be erected in appropriate places.

OBITUARY

Mr. G. Smith.—For many years honorary secretary of the East Midlands Centre of the Institution of Electrical Engineers, Mr. Gilbert Smith, D.L.C.(Hon.), A.M.I.E.E., M.I.P.E., of Loughborough, Leics., has died in Loughborough Hospital after a short illness. He was a member of the staff of Loughborough College for many years, first as superintendent of the electrical fitting shop and from 1943 until his retirement in 1954 as chief engineer and deputy head of works departments.

Mr. H. W. Breeze, A.M.I.E.E., engineering works manager of W. T. Henley's Telegraph Works Co., Ltd., died suddenly on 4th March after a brief illness. Mr. Breeze commenced as a draughtsman in Henley's Engineering Department in 1919. He was appointed assistant manager of the Engineering Works in 1951, and became manager in April, 1955. He leaves a widow and son.



The late Mr. H. W. Breeze

Mr. A. F. Mitton, who represented the "Atlas" Lighting Division of Thorn Electrical Industries, Ltd., in the Birmingham area, died on 26th February at the age of sixty-four. Mr. Mitton joined Smart & Brown (Engineers), Ltd., in 1950, transferring to "Atlas" in June, 1955.

Mr. Herbert Henry Holmes, chairman and managing director of Berry Wiggins & Co., Ltd., died on 20th February at the age of seventy-four. Mr. Holmes spent the early part of his business life in the electrical industry and when a private limited company was incorporated under the name of Berry Wiggins & Co., Ltd., in 1922, to develop the uses of electrical insulating compounds, he was appointed managing director, and later also became chairman. The company was later converted into a public company and entered the field of petroleum refining and the manufacture of bitumen. Mr. Holmes was a pioneer in the use of bitumen for road-surfacing materials.

Mr. H. W. P. Matthey, chairman of Johnson, Matthey & Co., Ltd., died on 6th March at the age of eighty. He joined the company in 1894, became a director four years later, and was appointed chairman of the company in 1928.

Mr. Robert Brotherton Whitfield, the last surviving partner of the firm of McClure & Whitfield, Mersey Dynamo Works, Stockport, died on 23rd February at the age of eighty-three. Mr. Whitfield, with Mr. David McClure, commenced business in 1893 at Lower Wellington Mills, Stockport, as electrical engineers and manufacturers of d.c. machines. One of the early plants for a public authority was the first five steam driven generators for the Stockport Corporation (1898-1900) installed in connection with the replacement of horse-drawn cars by electric traction, and a later installation was the gas engine driven station for the Thames Embankment lighting for the London County Council. On the electrical contracting side one of the early installations (in 1898) was at "Fairfield," Victoria Park, Manchester, the home of Sir Alfred Hopkinson. The successors of the firm on the contracting side are Piggott & Whitfield, the latter being the son of Mr. R. B. Whitfield. Mr. C. W. Piggott joined the old firm in 1899.

WILLS

Dame Caroline Haslett, D.B.E., for over 30 years director of the Electrical Association for Women, who died on 4th January last, left £26,521 gross (£25,955 net).

Mr. F. Lafargue Best, M.I.E.E., managing director of Best Products, Ltd., who died on 6th December last, left £18,095 gross (£17,504 net).

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £197 0s 0d
COPPER, H.C. Electro	ton £238 15s 0d
Fire Refined 99·70%	ton £237 0s 0d
Fire Refined 99·50%	ton £236 0s 0d
COPPER Tubes ..	lb 2s 4½d
Sheet	ton —
H.C. wire and strip ..	ton £290 15s 0d
LEAD, English ..	ton £113 10s 0d
Foreign	ton £112 0s 0d
MERCURY	flask £84 15s 0d
TIN, block (English) ..	ton £758 10s 0d
ZINC, G.O.B. Foreign	ton £97 5s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 1s 11½d
Sheet	ton —
Wire	lb 2s 8½d
PHOSPHOR BRONZE	
Wire	lb 3s 11½d
PLATINUM	oz £34 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 26½d—26¾d

THE BRUSSELS EXHIBITION 1958

Call for Support of British Electrical Section

ABOUT six months has elapsed since Lord Chandos made an appeal to the electrical industry for financial support for the British electrical display at the 1958 Universal and International Exhibition in Brussels. Although there has been a good response the amount guaranteed falls very short of the total of £120,000 which the section is expected to cost.

We have already given brief particulars of the proposed British Electrical and Allied Industry Section. Work on the British Industries Pavilion, in which the section will be housed, is in hand and at a Press conference on Monday last progress was reported.

Mr. D. Maxwell Buist, export director of the British Electrical and Allied Manufacturers' Association, who is chairman of the Organising Committee, after some introductory remarks introduced Baron de Gerlache de Gomery, of the Belgian Embassy, who said that it was expected that from 30 to 35 million visitors (probably about two million from the United States) would visit the exhibition. The Belgian Government was making elaborate plans for the convenience and comfort of these visitors.

Sir John Balfour, who is the British Commissioner-General for the Exhibition, said that the British Industries Pavilion was being organised by British Overseas Fairs, Ltd., an F.B.I. subsidiary whose chairman was Mr. Leslie Gamage. Sir John briefly indicated the nature of the British Government and industrial sections and said that the Exhibition would be a clearing house of international ideas. It was expected that many visitors would come with " orders in their pockets."

Mr. W. P. N. Edwards, organiser of the British Industries Pavilion, paid a tribute to B.E.A.M.A. for the part it was taking. He said that the electrical industry had now become the greatest single exporting industry and he referred to the significance of the proposed European common market. The aim of the British Industries Pavilion was to concentrate on the highlights of British industry to show that we were in the forefront of invention and development. The display would start with raw materials and proceed to power and energy; exhibits by the Atomic Energy Authority would be supported by a separate exhibit by the Nuclear Power Plant Co. Then there would be sections covering machines and general engineering, communications, services to industry and consumer goods. Special features would include a cinema and an information centre for visitors, including a novel telephone exchange through which it would be possible for them to dial any number in this country.

At the conference further particulars were given of the electrical industry's exhibits. The best possible use is being made of the 5,000 sq ft allocated to the display; nearly half of the area will be on two levels, thus considerably increasing the available space.

In three " Chambers of Energy " developments in steam, hydro-electric and nuclear power generation will be depicted, and atomic power station instrumentation will be shown.

Electricity in road, rail, sea and air transport will be represented and a composite exhibit will demonstrate the important contribution of electricity to a variety of industries. Other aspects dealt with will be electronics and telecommunications, transmission and distribution, overseas development, domestic electrification and lighting.

It should be stressed that the British Electrical and Allied Industry Section is not confined to members of the B.E.A.M.A. It is an opportunity for the whole of the industry to show the world what it can do and contributions towards the cost will bring rewards. Full particulars of the display can be obtained from the Organising Centre, British Electrical and Allied Industry Section, Brussels Exhibition, 1958, 36, Kingsway, London, W.C.2.

Models of the British Government pavilion and of the Industrial Pavilion were on view at the conference. Similar models are being displayed in the show windows of some of the leading electrical concerns, the first being at the A.E.I. premises, Crown House, Aldwych, London, W.C.2.

At the Brussels Exhibition Press conference (left to right): Col. B. H. Leeson, Mr. Leslie Gamage, Baron de Gerlache de Gomery, Mr. D. Maxwell Buist, Sir John Balfour and (speaking) Mr. W. P. N. Edwards

Prevention of Corrosion

Cathodic Protection of Iron and Steel Structures

IN a paper presented before the Institution of Electrical Engineers last week, Messrs. L. B. Hobgen, C.B.E. (Air Ministry), K. A. Spencer and P. W. Heselgrave (Spencer & Partners) dealt with cathodic protection of iron and steel structures as a means of mitigating corrosion. Virtually all corrosion, the authors pointed out, arose from the tendency of a metal to lose positive ions to a surrounding electrolyte and thus to acquire a negative charge. An equilibrium potential between the two was established at which the rate of this loss equalled the rate at which the ions were drawn back by the negative potential.

There were two means of applying cathodic protection —the "sacrificial-anode" and the "power-impressed" methods. In the first, blocks of magnesium, zinc and aluminium, which were more electro-negative than the structure, were attached to it, losing positive ions to the electrolyte and consequently acquiring a surplus of electrons. Some of these flowed via the metallic circuit to the protected structure depressing its potential. This caused the metal-electrolytic reaction to be such that positive ions did not leave its surface. Magnesium anodes (usually fabricated from Mg-Al-Zn alloy, which gave more even corrosion than pure metal) had a driving voltage more than three times that of zinc and was therefore preferable when the resistance of the electrode was not extremely low. The high efficiency of zinc anodes (containing less than 0·01 per cent of impurity) made them more suitable when electrolyte resistance was low (20 to 30 ohm-cm).

Power-Impressed Method

For power-impressed protection the negative terminal of a d.c. source was connected to the structure and the positive terminal was connected to anodes immersed in the electrolyte, thereby causing the transfer of electrons to the structure. The d.c. voltage varied from less than 6 in sea water to more than 50 in high-resistance soil. Currents required were from 1 A for protecting a well-coated pipe line to 1,000 A or more for the steel piles of a large jetty.

When measuring the potential between a metallic structure and the electrolyte the electrical connection to the latter was made by a "half-cell" consisting, where used in soil, of pure copper rod dipping into a saturated solution of copper sulphate, both contained in a plastic tube with a wooden plug at one end. The capillaries of the wood gave a conducting path between the solution in the tube and the electrolyte without appreciable contamination. Where used in sea water, the anode was a silver rod coated with silver-chloride dipping into a solution of chloride ions. Half-cells should preferably be placed close to the structure.

The amount of protective current requisite was ascertained by adjusting the d.c. until the minimum structure-electrolyte potential was approximately 0·85 V against a copper/copper-sulphate half-cell. The generator should be left on for an appreciable time to allow reactions at the metal-electrolyte interface to reach equilibrium. When the structure was well coated maximum potential might be reached within an hour, but if corroded this might not occur for many months. If, however, the electrolyte contained appreciable amounts of carbonate, calcium and magnesium salts, the consequent resistive deposits would reduce the long-term current requirement very considerably.

Cathodic protection for buried water and oil pipes depended almost entirely on the quality of the coating, if any. A bare 8in pipe line would need 30 to 50 A/mile, varying with the nature of the soil, the d.c. sources being installed at intervals of one mile, but with a coating of very good quality a single installation could protect 20 to 50 miles. In electrically undeveloped areas diesel or gas engines were used to supply a.c. for transformer-rectifier units the cost of which, though high, nevertheless provided cheap insurance for securing continuous operation.

Cathodic protection of electric power cables was in somewhat limited use at present in this country, but the Post Office had 100 installations using magnesium anodes and over 80 of the power-impressed type needing less than 5 A. Since many cables were in ducts, corrosion could not be eliminated but there was a substantial reduction in the number of faults. For the protection of lead the potential between it and the soil must be more negative than −0·55 V.

Cost of Typical Installations

Expenditure on cathodic protection was subject to many variables necessitating individual designs, but typical figures based on a large number of installations were given. The cost of a protective system was generally about 1 to 5 per cent of that of a newly coated and buried pipe line. For example a 10in diameter welded steel pipe line with protection in a rural area would cost about £10,000/mile apportioned as follows: bare pipe at site, £4,300; installing pipe line, £4,400; coating pipe line, £1,000; cathodic protection, £300 (i.e. 3 per cent). The current could be 1 A/mile and the annual power bill £5/mile. Costs per mile for a bare pipe line would be about £9,000 plus £1,400 for cathodic protection, but the annual cathode protection running cost would be approximately £80. The use of both coating and cathodic protection therefore provided the best scheme, technically and economically, in such a case.

Cathode protection could also be applied to prevent further corrosion of existing pipes, on the replacement of which £5 million was spent in this country each year. An instance was a 12in steel water pipe, coated inside and out with bitumen, just over six miles long. This was laid in 1937 and in 1948 the first leak occurred through corrosion pitting from the outside owing to peat soils and the activity of sulphate-reducing bacteria. Up to October, 1953, when cathodic protection was introduced, 25 leaks occurred. Thereafter they ceased. Cathodic protection cost £2,800 and the annual running cost was £80.

Experience indicated £20 to £25 per ampere of required protective current to be a reasonable estimate of the initial outlay for the power-impressed method and from £10 to £15 for the sacrificial-anode method, but the latter entailed considerably higher maintenance costs owing to recurrence of the equivalent of the initial expenditure about once every four years. For a tanker of 16,000 tons dead weight the cost of magnesium-anode protection of the centre compartments, used for sea-water ballast, would be from £4,000 to £6,000, depending upon

the type of petroleum product carried, and was renewable after three to five years. This contrasted with the cost of renewing the bulkheads after ten to twelve years, which might amount to £200,000.

DISCUSSION

Opening the discussion, Mr. W. T. J. Atkins (C.E.A.) said that applications of cathodic protection in Great Britain had mostly been on a relatively small scale, but the Gas Boards were now contemplating big extensions involving very long pipelines to be protected in this way. Special difficulties arose in urban areas, and two years ago the Joint Committee for the Co-ordination of Cathodic Protection to Buried Structures, consisting mainly of public utilities, had been set up to regulate the application of this system where the leakage current from a protected structure was liable to cause interference. One of its most important tasks was to standardise methods of testing and surveying and to establish agreed criteria of risk, setting up a standard of responsible behaviour and finding a *modus vivendi* whereby the conflicting interests could be reconciled and the technique widely applied. The paper seemed to him to over-simplify the problems considerably. It laid down quite arbitrary figures for the tolerable shift and negative maximum voltages which should be permitted. The Joint Committee was not prepared to recognise any specific criteria in the present state of knowledge.

Dr. F. Wormwell (D.S.I.R.), the chairman of the Technical Panel of the Joint Committee, said he had felt strongly for some years that in the national interest full use should be made of cathodic protection. The broad basis of the subject was well established, but the application bristled with difficulties. No one should be dogmatic at this stage about so-called " permissible " or " acceptable " figures for protective potential or potential changes on neighbouring structures; much experiment and experience were still required. The 20 mV anodic shift put forward by the authors carried the implication that it could be used rigidly to decide what was and was not acceptable. His Technical Panel had, however, tentatively recommended that a potential change of this order should be accepted as a limit for the present to avoid delaying the installation of important cathodic protection systems. A decision would depend on many other circumstances, such as the relative importance of neighbouring structures and the existing corrosion hazard.

Cost of Maintaining Pipelines

Dr. W. H. J. Vernon, referring to the cost of maintenance of pipelines in this country, said the authors gave a figure of £5,000,000, and a few years ago he had estimated that it would be of that order. Since then, on the basis of estimates in the United States but making allowances for the different conditions here, he had arrived at a figure of at least £20 million, which showed the enormous field for extended application.

Mr. L. F. Scantlebury (Post Office) mentioned that the number of faults on telephone cables solely due to corrosion was over 5,000 a year at a cost to the department of at least £500,000. Post Office installations of cathodic protection to date were mainly in rural districts. They would now like to extend the system to larger centres, with larger cables, where faults were more costly to repair and interfered more seriously with the telephone circuits. In view, however, of the greater likelihood of interference with the plant of other undertakers, little more could be done to extend cathodic protection until joint schemes for gas, water and electricity and telephone cables could be produced.

Mr. J. M. Cowan described some experiments carried out in the area of the Merseyside and North Wales Gas Board on a 21-mile section of pipeline which would ultimately be 120 miles long. The metal pipe was well insulated from the earth and the protection was of the power-impressed type, with two ground-beds in the 21 miles. In 20 of the 120 places where the Electricity Board's cables were near the gas pipe there had been a positive swing of more than 100 mV and in another 60 at least 20 mV, so that on the basis of a 20 mV positive swing being dangerous, 80 points out of 120 were affected. He advocated a ground-bed every mile.

Mr. W. Lloyd Ellis (Wales Gas Board) said that when cathodic protection was applied to a buried steel pipeline which had a first-class protective coating the design and installation of the protection were straightforward and the expenditure could be less than 1 per cent of the capital cost of the pipeline. The major difficulty was the accelerated corrosion caused to neighbouring buried metalwork. The only practical method of nullifying interference effects seemed to be by metallic bonding between the pipeline and the points of potential swing, but this could cause complications.

Dr. G. E. Gardam (Aluminium Laboratories) discussed the cathodic protection of steel immersed in sea-water by means of sacrificial anodes of magnesium, zinc and aluminium alloy.

Mr. J. H. Gosden (C.E.A.) said that while a 20 mV positive change acting by itself would not often produce faults in the normal life of cables, it could be superimposed on some other corrosive influence. Experience so far did not indicate conclusively that 20 mV erred by an amount in either direction sufficient to cause serious embarrassment either to the users of cathodic protection or to others, but further consideration should be given to it.

Power Station Cooling Systems

Mr. J. H. Morgan said that many power stations, particularly some of the proposed nuclear power stations, relied on sea-water or estuarine water cooling. Recent developments allowed the economic use of impressed-current systems to provide complete protection for the inside of the water-carrying pipelines and heat-exchangers. A life of five to ten years could be achieved with no reduction in flow or decrease in efficiency of the heat-exchange equipment.

Mr. P. V. Palmer expressed disappointment that the authors had said nothing about the canalisation of stray currents from traction systems.

Mr. A. C. Vivian suggested that in this country, where the main problem was interference with other structures, the magnesium anode would often be more acceptable than the power-impressed system, in which larger currents would have to pass through the earth from the ground-base to the structure.

Mr. G. A. Broughall (British Railways) suggested that if the railways were a source of grave corrosion they would feel the effect on their own numerous structures, but they did not do so. Any troubles had been strictly limited and always capable of being dealt with as individual cases.

Nuclear Power Course

THE Imperial College of Science and Technology, London, S.W.7, is commencing in October next a year's full-time post-graduate course in nuclear power. The course will include lectures, practical work and visits. The fee for the full course of three terms will be £64. Full particulars can be obtained from the Registrar of the Imperial College.

Development in South Scotland

Board's £1,160,000 Surplus in 1956

IN its first full year's report, for 1956, the South of Scotland Electricity Board records steady progress in the provision of new generating plant and the reinforcement and extension of distribution networks, despite reductions required by the Government in capital expenditure. Tariffs were maintained at their existing levels and, looking to 1957, the Board says that "unless budgets are upset by unforeseeable circumstances, the year should provide revenues sufficient to meet outgoings, and perhaps enable some further contribution to be made to general reserve." With £1,000,000 transferred from the surplus of £1,165,588 on last year's operations this reserve now stands at £1,500,000.

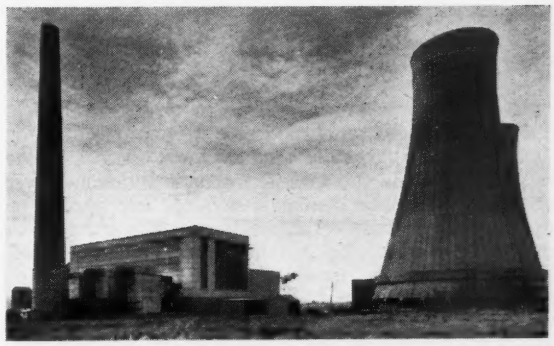
At 31st December the Board's installed plant capacity—

Table I.—Generating Plant Programme

Approved Programme, Year	Station	Installed capacity, MW
1957	Barony	30
	Dunfermline	12·5
	Dalmarnock	60
1958	Kincardine	120
1959	,,	120
1960	,,	120
1961	Nuclear	180
Total approved		642·5
Provisional		
1962	—	240
1963	—	240
1964	—	240

in twelve steam and seven hydro stations—was 1,368 MW, a net increase of 116 MW compared with a year ago. New plant included the first 30 MW set at the new Barony station, which is designed to burn washery slurry and is the first station of its kind in the United Kingdom. Additional 60 MW sets were brought into service at Dalmarnock H.P. and Portobello H.P. stations. Obsolete plant was shut down at Greenock (where generation has now ceased) and Kilmarnock, and two surplus auxiliary sets at Glenlee were sold to the North of Scotland Hydro-Electric Board.

The plant extension programme (Table I) provides for the installation of 642·5 MW in 1957-61, including 180 MW as the first half of the proposed Hunterston nuclear power station to be built by the G.E.C.-Simon-Carves group. The second half is scheduled for completion in the following year, when this station, operating at a high load factor, will provide approximately a quarter of the total energy required in the South of Scotland.



Barony generating station in Ayrshire where the first of two G.E.C. 30 MW sets was commissioned last year. The Babcock and Wilcox boilers are designed to burn slurry

Investigations into pumped storage were continued in conjunction with the North of Scotland Board and the Central Electricity Authority. A proposal that the Braehead station should be converted from coal to oil firing was considered but it was decided that such a step would not be justified.

The average thermal efficiency of the Board's steam stations improved from 24·74 per cent in 1955 to 25·04 per cent last year, which meant a saving of 33,690 tons of fuel. Portobello H.P. station held the leading position with a thermal efficiency of 30·92 per cent. The total quantity of fuel received at the generating stations last year was 2,778,003 tons; this included only 28,287 tons imported from abroad against 177,283 tons in the nine months April to December, 1955. The average price of fuel, adjusted for calorific value, increased during the year from 76s 7d to 86s 10d a ton which more than offset the benefit gained through higher thermal efficiency.

Arrangements were continued whereby the Board's system ran interconnected at all times with that of the C.E.A. and it is estimated that the overall saving in fuel by this means during the year was 80,000 tons. The North of Scotland Board, under its agreement, declared an additional 30 MW available as from 1st February, 1956, a further 20 MW as from 1st November and another 10 MW as from 1st December, when the total available was 275 MW. The North of Scotland Board imported supplies at times other than peak periods.

The maximum demand of 1,406 MW met by the Board occurred between 4.30 and 5 p.m. on 27th December and was slightly below the 1955 figure. The difference between m.d. and output was covered by imports from the North of Scotland Board and the C.E.A., which as will be seen in Table II were greater than during 1955. During November

Table II.—Energy Sent Out and Purchased

	Twelve months ended 31st December 1955		1956		Per cent inc. or dec.	
	MW*	Million kWh	MW*	Million kWh	MW	kWh sent out
Time of District maximum simultaneous demand ...	5p.m. 21/12/55	—	5p.m. 27/12/56	—	—	—
Board's steam stations ...	999	4,705	966	4,756	— 3·3	+ 1·1
Board's hydro stations ...	106	220	100	277	— 5·7	+25·9
Total	1,105	4,925	1,066	5,033	— 3·5	+ 2·2
Purchased from:						
C.E.A. (net)	129	350	26	540	—79·8	+54·3
North of Scotland Board ...	159	184	301	362	+89·3	+96·7
Others	15	32	13	28	—13·3	—12·5
	303	566	340	930	+12·2	+64·3
Sold to:						
North of Scotland Board ...	—	60	—	58	—	— 3·3
Total delivered to system ...	1,408	5,431	1,406	5,905	— 0·1	+ 8·7

* All demands are simultaneous at times of District maximum demands

Table III.—Cost of Generation (including capital charges) per kWh Sent Out and of Electricity Purchased

	Cost per kWh	
	Nine months April-Dec., 1955	Year, 1956
Generated in South Scotland	d	d
At steam stations	0·711	0·790
At hydro stations	0·285	0·219
	0·693	0·759
Purchased Supplies		
From North of Scotland Board	2·255	1·401
,, C.E.A.	0·951	0·802
,, other sources	0·788	0·770
Total ...	0·751	0·802

and December the proportion of the Board's generating plant available at times of peak load was never less than 84·4 per cent and the highest availability obtained was 97·5 per cent. The system load factor improved from 44 to 47·8 per cent. Table III gives the charges for energy purchased. These figures, it should be noted, include amounts in respect of peak periods in addition to running charges and the resulting average is therefore not directly comparable with the average cost of generation at the Board's stations.

The 132 kV transmission system was extended during the year by 15·28 circuit-miles; six transformers having a total capacity of 232,500 kVA and two new substations and extensions to five substations were commissioned. Work continued on the erection of 90 circuit-miles of 132 kV overhead line and another new substation and extensions to five others. Civil work was completed at a new 275 kV substation at Clyde's Mill and the erection of the 275 kV isolators and 120,000 kVA 275/132 kV auto-transformers was commenced.

Distribution systems extensions included the commissioning of ten additional 33 kV substations, while a further sixteen such substations, required to reinforce existing networks, were in course of construction. Standardisation of supplies is approaching completion; at 31st December last there remained only 69 consumers on d.c. supply and 4,531 on non-standard-voltage a.c. systems. It is hoped that the change-over will be finished by the end of this year.

Following successful trials with aluminium-cored cables, this type is now being specified for a large proportion of the Board's requirements. The estimated saving in a full year is of the order of £160,000.

V.h.f. radio communication between reporting centres and motor vehicles continued to prove its worth as a means of saving time in the restoration of supplies, in carrying out routine maintenance, and in dealing with consumers' needs. At the end of the year the number of fixed stations in operation was fifteen and mobile stations numbered 181, including 21 portable sets.

Besides supporting research associations, to which some £38,000 was subscribed last year, the Board's own staff conducted investigations of various kinds. For example, research was made into the use of pulverised fuel fly ash; peat burning; the control of mussel growth in circulating water pipes; the use of aluminium for overhead lines and underground cables; and the preservation of wood poles. Investigations into off-peak heating of buildings have included further tests on the behaviour of different types of floor covering on electrically heated floors.

Dealing with the Board's commercial operations, the report shows that sales to consumers amounted to 5,299 million kWh, an increase of 8·7 per cent. An analysis of supplies to the various classes of consumers is given in Table IV. A plan was published for completing in a systematic manner the development of those parts of the rural areas still without a supply. This work, which covers some 2,500 farms and 7,200 other premises, will cost about £2·5 million and is scheduled for completion by 1960. Last year £844,796 was spent on rural development, a further 767 farms being connected. The proportion of farms in the District now served is 75 per cent. To assist small users, the Board agreed to a suggestion by the Consultative Council that consumers chargeable under the farm tariff should be given the option of having the farmhouse charged under the domestic tariff and the remainder of the premises under the Board's general block tariff.

As shown in the table, sales to industrial consumers increased by 6·7 per cent. To demonstrate methods by which productivity can be improved by the use of electricity, an electronics and productivity conference and exhibition was held and was attended by 8,500 industrialists and others. Development of off-peak loads was actively pursued and several large electric heating installations of this kind in office buildings, schools, churches, garages, etc., were dealt with. There was also evidence of increased interest in off-peak space and water heating among domestic consumers. The success of the all-electric multi-storey flats at Kirkcaldy has encouraged similar schemes elsewhere. Further all-electric flats were built by the Scottish Special Housing Association at Toryglen, Glasgow, and the Corporations of Glasgow, Edinburgh and Paisley have decided to erect similar blocks of flats. The total off-peak load connected at the end of 1956 amounted to 92,394 kW of which 35,690 kW was installed during the year. More than half of this new load was in commercial buildings as the following analysis shows: domestic 968 kW (58 consumers); farms 1,156 kW (119 consumers); commercial 18,857 kW (1,077 consumers); and industrial 14,709 kW (123 consumers).

Table IV.—Electricity Sales and Number of Consumers

Class	Sales in Million kWh			Number of Consumers		
	Twelve months ended 31st December		Inc. or dec.	At 31st December		Inc. or dec.
	1955	1956	%	1955	1956	%
Domestic ...	1,420	1,570	+10·6	1,098,253	1,127,184	+ 2·6
Farm	94	105	+11·7	11,419	12,186	+ 6·7
Commercial ...	678	765	+12·8	113,122	115,552	+ 2·1
Industrial ...	2,577	2,749	+ 6·7	11,224	11,296	+ 0·6
Traction ...	14	6	−57·1	2	1	—
Public lighting	92	104	+13·0	141	140	—
Total ...	4,875	5,299	+ 8·7	1,234,161	1,266,359	+ 2·6

A growing appreciation of the advantages of electric cooking is also reported, cooker sales having improved by 29 per cent during the year. A further twelve housing authorities decided to allow their tenants freedom of choice and now only 41 out of 142 authorities do not give their tenants the opportunity to cook by electricity.

New service centres were opened at Cathcart, Giffnock, Springburn, Cumnock and Pollok, and larger premises were opened at Victoria Road, Glasgow, and at North Berwick. Premises were acquired for the centre of Bathgate, and other new centres are to erected at Greenock, Alexandria and Clydebank.

Board's Accounts

Capital expenditure for the year, restricted in accordance with Government policy, totalled £16·9 million. External borrowing amounted to £9 million and the remainder of the Board's requirements were met

internally. Repayments totalling £1·25 million were made to the C.E.A. and in respect of local authority and other loans.

Income from sales of electricity totalled £32,171,912 (against £20,050,217 for nine months of 1955). The average prices per kWh to the various classes of consumers were as follows, with comparative figures for April-December, 1955, in parentheses:—Domestic 1·501d (1·443d); farms 1·475d (1·526); commercial 1·770d (1·738d); industrial 1·335d (1·251d); public lighting 1·306d (1·353d); traction 1·329d (1·272d); and sales to North of Scotland Board 0·725d (0·902d). With other income and a surplus of £194,303 from contracting and sales of fittings the total revenue was £32,471,139 (£20,229,369). Expenditure amounted to £31,305,551 (£19,640,545) including £1,218,145 (£721,926) for local rates and there was a surplus of £1,165,588 (£588,824), equivalent to 3·59 per cent of the Board's total revenue.

The report reviews various other activities of the Board including joint consultation; education and training; safety, health and welfare. A superannuation scheme covering all staff and manual workers was approved by the Secretary of State on 23rd November last, with retrospective effect to 1st December, 1954.

One of the subjects dealt with in the report of the Consultative Council is the installation of cookers in houses on new estates. While welcoming the change of policy of some local authorities in favour of freedom of choice the Council expresses concern at the continuance of Government credit restriction which prevents the Board from re-introducing hire schemes which have proved extremely beneficial in furthering the use of electrical appliances, particularly the installation of electric cookers.

COMPUTERS FOR NUCLEAR POWER STUDIES

TWO papers on analogue methods applied to nuclear research were presented by Mr. G. J. R. MacLusky (U.K. Atomic Energy Authority) on 12th March before the Measurement and Control Section of the Institution of Electrical Engineers.

The first described a new analogue computer installed at the Atomic Energy Research Establishment. A nuclear power system, it was pointed out, almost always involved the circulation of a primary coolant in a closed loop through the reactor and external heat exchangers, the temperature within the reactor and its resultant reactivity depending on the conditions in the external system.

The net reactivity, determined by the combined effect of temperature and control-rod position, decided the rate of change of mean neutron flux and hence rate of change of power liberated. This power affected temperatures within the reactor, the temperature rise of the primary coolant and therefore the external power available.

All these thermal interactions were modified by the thermal capacities of the various structures and by the time delays caused by the coolant circulation, so that the complete system had to be considered as a problem in process control. There was also some external feedback imposed by the motion of the control rod in response to power-level control which had its own characteristic time constants. The consequences of a wide variety of possible faults must be evaluated, since redesign of one component might entail changes in many others.

Computer Design

The analogue computer referred to above was in three major sections. The first simulated the behaviour of the neutrons in the reactor and involved basic kinetic equations, which determined how the rate of change of power was affected by the net reactivity and by the prompt or deferred neutron lifetimes. The second simulated the behaviour of the control servo-mechanisms and of the electronic amplifiers used to provide voltages proportional to reactor power and its time differential, from which the control programme was derived. The third section simulated the behaviour of the thermal system in regard to temperature changes in the various parts of the reactor (fuel, fuel-sheath, coolant and moderator), transfer of heat to the coolant, time delays in coolant circulation and transfer of heat through the heat exchanger to produce steam. A d.c. electronic analogue system was employed with identical unit amplifiers interconnected by external networks which determined the form of the equations solved and their coefficients.

Xenon Poisoning

In his second paper Mr. MacLusky applied analogue methods to compute and predict xenon poisoning in a high-flux nuclear reactor. Xenon 135, he said, was the most important of the fission products having large neutron-capture cross-sections whose growth reduced reactivity. Thus for a heavy-water-moderated enriched-fuel reactor with a peak neutron flux of 10^{14}n/cm^2/sec the equilibrium value of xenon poisoning was 5·2 per cent in reactivity. This would increase during shut down at an initial rate of 2·9 per cent per hour, reaching a peak of 18 per cent after eleven hours and then requiring a further twenty-eight hours to fall to its original equilibrium value. Such variations in reactivity were very large compared with those produced by control-rod position, reactor volume or location of materials being irradiated and might outweigh their effects.

A reactor that had been operating at steady conditions of power and gross reactivity, as set by control rods, and was then shut down for an appreciable period, would need to have its gross reactivity increased beyond the original value by an amount corresponding to the increase in xenon poisoning in the interval. For rapid starting up an operator might need to know the gross reactivity at which criticality would be reached.

After a prolonged shut-down, restarting might have to be delayed for perhaps forty hours to allow for the decay of xenon to a suitable level. Similarly a rapid reduction in operating power might require an appreciable rate of increase of gross reactivity merely to maintain the new steady power level because of the rapid build-up of poisoning. For a rapid increase of power the converse would apply with a possibility of an uncontrolled surge of power. These considerations were especially serious in highly rated mobile reactors.

The electronic analogue computer was supplied continuously with the value of the reactor power and would derive from it the amount of xenon poisoning. An estimate of future poisoning was obtainable from an associated predictor which took its initial conditions from the computer, the assumed future reactor power being set in manually.

Electricity in the Swedish Home

ON Monday last Miss P. E. Grady (London Electricity Board) gave the Caroline Haslett Trust Lecture at the Institution of Electrical Engineers, on "Electricity and the Swedish Way of Life." Miss Grady, who exhibited lantern slides, said that in Sweden electricity was generated almost exclusively by water power and due to its abundance and cheapness was used with almost careless abandon. Of about two million householders, only about 30,000 were to-day without electricity, which meant electrification to a degree of 98½ per cent; domestic consumption accounted for 30 per cent of the total energy.

There were two important organisations, the F.E.R.A., which was a body similar to the Electrical Development Association, and the S.E.M.K.O., the Swedish bureau for testing electrical equipment. Compulsory testing had been introduced in Sweden to a large extent. In the testing of equipment for domestic and similar installations it was necessary to have regard to d.c. which was still largely used in some Swedish towns. The "S" mark on appliances, indicating that they had passed stringent tests, were looked upon by the general public as a guarantee of good workmanship. Most of the supply authorities had permanent exhibitions which were used for advice and choice of appliances, but the actual sales were left to the stores selling the appliances. The municipal authorities employed a "Konsultant," who was the equivalent of the housecraft adviser in this country.

Miss Grady gave particulars of the design and performance of electrical equipment for domestic purposes, and said that although there was a wide range of all types, the colour trend was noticeably absent; white enamel still held sway, with a few cream models. Central heating in houses eliminated the need for space heating appliances and electric blankets, though a few models were available. There was a great demand for lamps of all kinds. Refrigerators were considered to be an essential part of any house. Speaking of lighting, Miss Grady said that the Swedish people had the knack of combining good lighting and artistry. Fluorescent lamps were steadily gaining popularity in the kitchen, and were often used as concealed lighting in lounges and halls.

In rural areas, the farms were electrified to a great extent, both in the kitchen and on the farm. In order that people living away from the towns could learn about the facilities which electricity provided, the State Power Board had a large exhibition bus, fully equipped with electrical apparatus on circuit, which toured the country areas.

Lighting in America

IN an address to the Birmingham Centre of the Illuminating Engineering Society on 22nd February, Dr. R. G. Hopkinson, vice-president, dealt with some impressions of his recent visit to America to attend the Fiftieth Anniversary Convocation of the American I.E.S.

The most important conclusion he had drawn from his visit was that in the U.S.A. research on visual comfort and efficiency was considered of prime importance, and he felt the great value of being able to exchange information with many other groups lead to this. He felt somewhat in isolation in England, because studies in visual comfort tended to be looked upon as academic and of little interest to the practical man. In the U.S.A. they were fully convinced that practical lighting demanded visual comfort, that there was money in visual comfort and they were all out to get it.

Research in England, went on Dr. Hopkinson, was fully up to that in the U.S.A., and in some cases we were ahead. On the other hand the U.S.A. was ahead in the adaptation of modern recording and analysing equipment to lighting research, and in the employment of professional statisticians in lighting research.

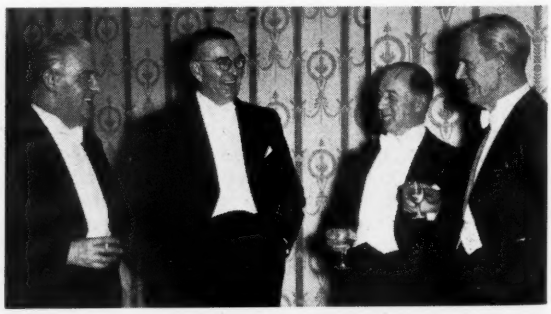
Dr. Hopkinson paid a special tribute to the work of C. L. Crouch, Professor E. M. Strong and their associates on the Illuminating Engineering Research Institute, a body which directs lighting research in many university laboratories. This body is financed by the manufacturers who are convinced that independent research means progress and commercial advantage for them. The most interesting project was that on overall ceiling lighting. The claim was now made that higher levels of lighting could be produced by artificial means, with less visual discomfort, than could be produced at present by natural lighting.

Liverpool E.C.A. Dinner

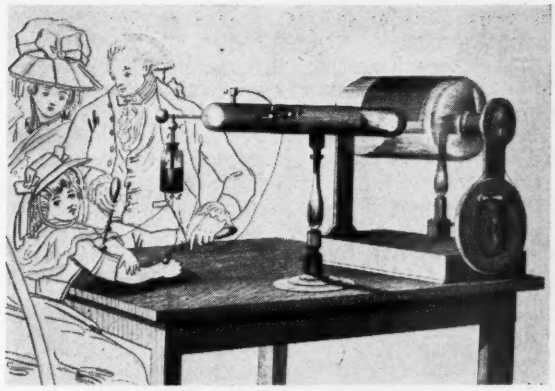
THE annual dinner of the Liverpool Branch of the Electrical Contractors' Association was held on 4th March, Mr. J. Pinnington presiding. Mr. A. R. Cooper, controller, North West, Merseyside and North Wales Division, C.E.A., in proposing the toast of the Association, commended the E.C.A. for its interest in the training of apprentices. He said they had set an example which ought to be copied in other industries, but the biggest training problem was to find the men adequately equipped technically and in other ways to become future managers.

Mr. A. V. Milton (president, E.C.A.) said that when he started his own business he was assured by a fellow contractor that the private enterprise electrical contractor was doomed to extinction because so many of the supply authorities had embarked on contracting. How wrong he was! The E.C.A. now had a membership of 3,000. Not only did they meet the demands of the home market but also contributed to exports by the fulfilment of contracts abroad. While electricity had been accepted as the most economical source of energy, there still remained a vast field for development in electrical utilisation which had to be put across to the consumer. Particularly was it necessary to develop off-peak loads in order to achieve even higher efficiency of generation and distribution. Many Area Boards were now seeking the co-operation of electrical contractors in the development of particular forms of load. If the country was to hold its own in world trade there must be greater acceleration in the use and development of electrical equipment. That involved the fullest effective co-operation between all sections of the electrical industry, manufacturers, contractors and labour. The E.C.A. would co-operate to the fullest extent with governmental, technical, educational, trading and benevolent bodies and pledged its support towards efficient organisation and development of this vital industry.

Mr. J. J. Peters proposed the toast to the guests, and replies were made by the Lord Mayor of Liverpool (Ald. J. Sheehan) and Professor J. M. Meek (University of Liverpool Department of Electrical Engineering). Professor Meek said that a big expansion of engineering technology facilities was being planned. The Liverpool University authorities appreciated the excellent response to the appeal for funds to carry through this work. It amounted to over £600,000.



At the E.C.A. Liverpool dinner. Left to right: Mr. S. Dickinson (secretary, N.W. Counties Sectional Board, E.C.A.), Mr. W. T. Trace (past-president, E.C.A.), Mr. W. Gilchrist (chief commercial officer) and Mr. D. H. Kendon (chairman), M.A.N.W.E.B.



Electrical machine made by George Adams, circa 1785, in use for medical treatment (From Adams' "An Essay on Electricity," second edition, London, 1785)

HISTORICAL EXHIBITS IN LONDON

By R. ROBERT

Electricity in the Service of Medicine

THE Wellcome Research Institution in London with its Historical Medical Museum and Museum of Medical Science,* has arranged an exhibition in one of its many galleries which all readers interested in the medical aspects of electricity might well make a point of seeing. Practically the whole history of the subject is covered, both in literature and equipment, from the time of William Gilbert, physician to Queen Elizabeth I, and author of "*De Magnete*" (a work which contains an important chapter on electricity) to the present day. The collection is well assembled, in chronological order, and embraces old books, photographs, and early experimental apparatus.

Gilbert graduated as M.D. at Cambridge as far back as 1569, but it was not until the first half of the 18th century that the sensations felt by persons during electrification, particularly through the medium of the Leyden jar, led to speculations concerning the action of electricity on human muscles, on the nervous fluid, and on disease. Christian Gottlieb Kratzenstein (1723-1795) is the man generally regarded as the first to publish a treatise on the medical uses of electricity. He was a German: Professor of Physics first at Halle, then at St. Petersburg, and finally at Copenhagen University.

In all the early writings on electrotherapy much attention was paid to the treatment of paralysis, and many experiments were carried out, with varying degrees of success. The Abbé Nollet and Benjamin Franklin were among those to express doubts about the usefulness of electricity. Jallabert obtained encouraging results in at least one case with which he had experimented. De Haen, of Austria, and Boissier de Sauvages, Professor of Medicine at Montpelier University, were also able to report successes.

Many of these early practitioners of electrotherapy were "natural philosophers," or physicists, and few members of the medical profession gave the matter any attention—though the surgeons did so. Others who practised electrotherapy, such as Richard Lovett and John Wesley, were laymen concerned with ameliorating the lot of the poor, and at that time electrical treatment was being prescribed, and tried, for a whole range of complaints, from paralysis to toothache.

Many extravagant claims were made, and electricity was regarded with the credulous awe reserved, nowadays, for the "wonder drug." But there were no standard techniques, and this, added to the pains suffered by patients during and after treatment, led not only to disillusionment but to downright suspicion. Electricity was obviously no sovereign remedy for every conceivable kind of ailment, ache and pain. But, in particular directions, advances were certainly made, as witnesses the exhibit of a pamphlet, published by Sir William Watson in 1763, entitled "Observations upon the Effects of Electricity, applied to a Tetanus or Muscular Rigidity."

Watson describes the treatment he had applied to a number of paralysis cases after discovering that muscles could be stimulated by electricity. The case recorded in his pamphlet was a desperate one. A seven-year-old girl had a tightly-clenched jaw which all orthodox forms of treatment had failed to relax. Two of the girl's teeth had been removed to enable her to be fed, but at the end of four months she was "very emaciated and suffered from convulsions." The electrical treatment then resorted to, and continued for two months, was successful.

Early Electrical Apparatus

In this particular section of the Wellcome Exhibition will be found many of the curious machines usually only seen as illustrations to textbooks: plate and cylindrical electric machines, Leyden jars, and devices for displaying the effects of static electricity. An early magneto-electric machine, made by Pixii in 1832, is preserved in the museum, and will be seen to consist of a horse-shoe magnet designed to rotate across coils of wire wound on soft iron cores. It was used for both experimental and medical use.

Luigi Galvani, the Italian physiologist (1737-1798), inevitably looms large in the collection. It was the publication of his epoch-making work "*De Viribus Electricitatus in moto Musculari Commentarius*," in 1791, which opened up an entirely new era in the study of electricity. He had, for twenty years before the appearance of this treatise, investigated the action of electricity upon the muscles of frogs, and is famous for his theory of "animal electricity." Galvani established three fundamental facts:—That the frog's muscle nerve is a highly sensitive detector of electricity; that two metals in contact with a moist substance give rise to a continuous electric current (which led on to the invention by Volta

* The Research Institution is situated near Euston Station, N.W.1, and the Historical Museum is open from 10 a.m. to 5 p.m. Monday to Friday.

of the electric pile); and that electrical changes take place in living tissues.

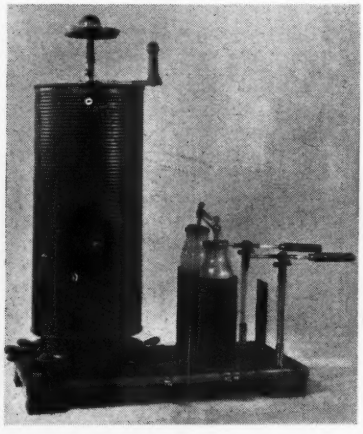
Two other experimenters in the same field, Kölliker and Müller, were able to demonstrate, in 1855, that the action of the frog's heart was accompanied by electrical changes. The study of those changes in man began when Augustus D. Waller (1856-1922) realised that electrodes applied to the limbs would show changes of potential originating in the heart. A Dutchman, Wilhelm Einthoven (1860-1927) on learning of Waller's experiments set to work to devise a more sensitive electrometer and in 1893 introduced his well-known " string galvanometer," which made possible a rapid advance in electro-cardiography. Recognition of the importance of the galvanometer was due, very largely, to Sir Thomas Lewis (1881-1945) who also deserves credit for the great progress made in electro-cardiography in the early years of the 20th century.

One of the bulkier pieces of apparatus in the Exhibition is the Finsen light installation for ultra-violet ray therapy, presented to the London Hospital, in 1900, by Queen Alexandra (then Princess of Wales). The central feature of the installation is a carbon arc-lamp placed centrally in a stand so that the light can be concentrated by means of four " telescopes " on four separate patients at the same time. The Finsen light was used mainly for treatment of lupus and similar skin diseases. A red curtain protected the patients from the direct action of light from the arc. A related exhibit is the Hanovia " Alpine Sun " quartz mercury-vapour lamp, first manufactured in the 1920s, rich in ultra-violet light and used for the treatment of certain forms of tuberculosis and skin disease.

Discovery of X-rays

A scientific event of major importance for medicine occurred in 1895 when Wilhelm K. Röntgen, the German physicist, discovered the short-wave, electromagnetic rays, similar to those of light, which were to become known as X-rays. This development was destined to make a tremendous contribution to diagnostic methods. The X-rays were able to penetrate solids; they began to be used to examine the interior of the human body and, of equal importance, in radiotherapy for the curing of malignant growths and cancer.

The Wellcome Museum rightly lays some emphasis on Röntgen, and this part of the Exhibition is of unusual interest. There is a fine collection of Geissler tubes, Crooke's discharge tubes, and early types of single- and double-focus X-ray tubes. Later types of air-cooled gas-filled X-ray tubes, and a Coolidge tube, are also included among the exhibits. The centre-piece, however, is a Siemens X-ray unit, with couch and stand.



D'Arsonval h.f. apparatus with an Oudin resonator, made by E. Ducretet, Paris, in 1899 (Presented to the Wellcome Historical Medical Museum by Dr. J. A. Rivière)

Finally, we are left to consider Pierre and Marie Curie, and their researches into radioactivity. The Exhibition includes some of the apparatus used by those two pioneer physicists, who noted in 1898 that radium could produce certain physiological effects. Pierre, in 1900, deliberately gave himself a burn to confirm the matter beyond doubt. The use of radium in therapy was then proposed and, in 1904, Pierre Curie published, in collaboration with two other scientists, a report of a series of experiments made on animals which established that radium could be used to destroy tumours, and to cure certain kinds of cancer.

The final chapter of this story has yet to be written: though the time is, perhaps, not far distant when the researches now being pursued in laboratories all over the world will bring victory over the scourge of cancer, quite possibly by means of the same electrical forces which have already played such a beneficent role in the treatment of some other human ills.

New Reactor at Harwell

A NEW experimental low energy reactor, " NERO," is now operating at the Atomic Energy Research Establishment, Harwell. It became critical for the first time at 7.45 p.m. on 23rd February, and its experimental programme is now beginning.

The reactor will be used to investigate the physics design problems associated with the more advanced types of graphite moderated power reactors now under study by the Authority. The reactor consists of a graphite stack which can be varied in size up to a cylinder of about 14ft diameter by 10ft high within a 2ft thick concrete biological shield. Fuel elements of differing types may be arranged within the graphite stack in any one of a number of possible lattice patterns. Restacking of the graphite to permit a change in the fuel element arrangement can be done in a few days.

The reactor is controlled by two vertical cadmium control rods which can be moved into the graphite stack through the top of the biological shield. Cadmium " shut off " or " safety rods " are arranged to move into the graphite stack in a similar manner. The maximum thermal neutron flux is about 10^8 neutrons/cm^2/sec and the heat output is restricted to less than a hundred watts.

The reactor will at first be used to check calculations on the effect of separating the fissile content of the fuel (e.g. U235 or Pu239) from the fertile content (e.g. U238); information of this kind is of great importance for the design of reactors in which nuclear fuel (e.g. plutonium) may be recycled through the reactor. Another application of the reactor is to investigate problems associated with the design study of a sodium cooled graphite moderated reactor. For this reason the name " NERO " is derived from the phrase " Na (chemical symbol for sodium) experimental reactor." The " O " is added to indicate that it is a zero energy (i.e. low energy) reactor.

Concrete Column Design

AT the fourth sessional meeting of the South Western Section of the Association of Public Lighting Engineers, held in Bath on 1st March, Mr. F. Cornelius presented a paper on " Concrete Columns." Much of the prejudice against such columns he thought was due to early designs being of a very unpleasing nature because of the need to provide adequate strength. With the advent of prestressed reinforcement, however, a considerable reduction in the volume of concrete columns had been achieved, and it was his opinion that within a further decade or two concrete columns would be made having proportions the same as those of their steel counterparts.

INDUSTRIAL NEWS

Atomic Information Exchanges

An agreement drawn up by Euratom provides for the exchange of technical and scientific information about nuclear power development between the signatories and for the obligatory granting of licences for the working of any patents. Provision is also made for the setting up of an agency for controlling the distribution of atomic materials and their use and for the establishment of a research organisation.

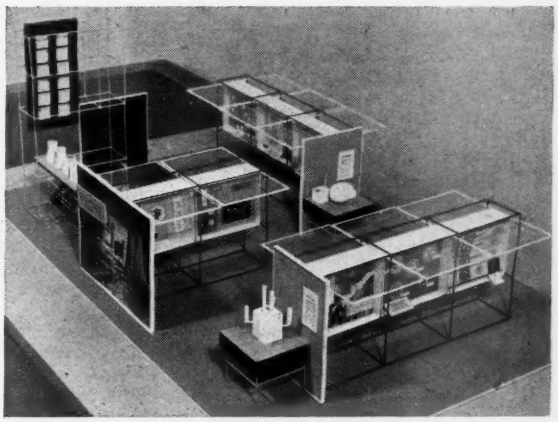
Replying to complaints in the United States Congress that the United Kingdom was not fully implementing its agreement with the United States for the exchange of information, specifically in connection with the operation of the Calder Hall reactors, the United Kingdom Atomic Energy Authority say that valuable information has been exchanged on a considerable number of reactor types. "The Atomic Energy Authority consider that they have given to the Atomic Energy Commission all the information on Calder Hall which is required under the agreement. Similar information on the Electricity Authority's reactors is being compiled for transmission to the A.E.C., subject to the limitations of Article 1D."

The Authority go on to say that it has offered to the A.E.C. detailed information on Calder Hall for A.E.C. use under Article IIA2 of the agreement in exchange for similar information on the American Shippingport reactor; this offer is still under discussion. No information has yet been received from the United States on military reactors (including the submarine *Nautilus*) under an amendment to the agreement.

British Atomic Energy Displays

The Board of Trade, in conjunction with the United Kingdom Atomic Energy Authority and in consultation with industry, will be organising two displays at overseas trade fairs in Germany and Australia to illustrate Britain's atomic energy programme. The first of these will occupy about 3,000 sq ft at the Hanover International Trade Fair from 28th April to 7th May next. The stand will explain the reasons which have led Britain, with her growing needs for energy and limited resources of indigenous fuel, to pioneer the development of nuclear power reactors. Models, photographs and diagrams will show the part played by each of the various components in a nuclear generating station and the problems which have to be overcome in constructing a station. A survey of Britain's other reactors will illustrate the extensive scale of the research behind the new programme announced by the Minister of Power.

The second display will go to Australia and will cover basically the same ground but will be mobile and will have a more general appeal. It will first be shown at the Sydney Industries Fair from 22nd July to 3rd August, where some British firms engaged in the atomics industry will have commercial exhibits on adjoining stands. It will be shown at the Royal Agricultural Show, Melbourne, from 19th to 29th September and later at Canberra, Perth, Adelaide and Brisbane.



Model of the United Kingdom Atomic Energy stand to tour Australia

South African Signalling Order

The Siemens & General Electric Railway Signal Co., Ltd., has received a contract from the South African Railways for colour-light signalling and power operation of points on the line which is being doubled and electrified between Dunswart and Alliance on the eastern outskirts of Johannesburg. Automatic signalling will be installed on the sections of the line east and west of the intermediate station at Van Ryn.

The signalling at Van Ryn will be controlled remotely by centralised traffic control methods from a panel at Dunswart by the operation of key switches and push-button on the track diagram. Eight pairs of points giving access to a loop at Van Ryn will be operated by electric point machines, normally under remote control from Dunswart, but four dual point controllers will be installed to permit local operation by power or, in emergency, by hand. Small illuminated point indicators on the panel at Dunswart, in the positions corresponding to the points on the track at Van Ryn, will show the routes set up.

The complete cabling and distribution system for sienalling and power supplies is included in the contract.

School Installation

On Friday last week, Mr. Michael Stewart, M.P. for Fulham, opened the new L.C.C. Hurlingham School for Girls, Fulham. As in the majority of modern schools now being erected, electricity is used extensively. There are 1,600 lighting points and 300 13 A socket-outlets totalling approximately 600 kW connected load, 80 impulse clocks, 12 fire alarm pushes and 100 radio outlets. Classroom lighting is by 100 W lamps, and the blackboard illumination is by a specially designed trough fitting with four 60 W lamps. The art, pottery, weaving and commerce rooms have 4ft 40 W "new warm white" fluorescent lamps in plastic troughs and most classrooms have as additional lighting three 5ft 80 W fluorescent tubes in angle reflectors.

The stage lighting is controlled by a 26-way Strand Electric "Junior Sunset" dimmer board with twelve 1,000 W dimmers controlling a variety of spots and floods mounted on a special grid above the stage. The architects for the school were Richard Sheppard & Partners and the specification for the electrical installation was prepared, and the work supervised, under the direction of Mr. J. Rawlinson, chief engineer to the L.C.C., assisted by Mr. C. A. Belcher, divisional engineer, and Mr. R. Plummer.

Camp Bird Developments

The Camp Bird group announce that they have acquired a substantial majority interest in the electronic, electrical and plastics engineering group of Hartley Baird, Ltd. The amount involved is £400,000. This acquisition completes the chain of electronic, automation and telecommunication companies begun by Camp Bird some twelve months ago. The integrated group now operates in the industry from research and design, through production, to retail outlets.

A central research and design department to service the whole group is being established at a new centre now under construction near Watford which will be under the direction of Mr. J. L. Thompson, managing director of the J. Langham Thompson Group. Camp Bird Industries are now established in New York, with offices at 70, Pine Street, and plans

are being laid to establish manufacturing and selling companies in the United States once the British group is more closely integrated.

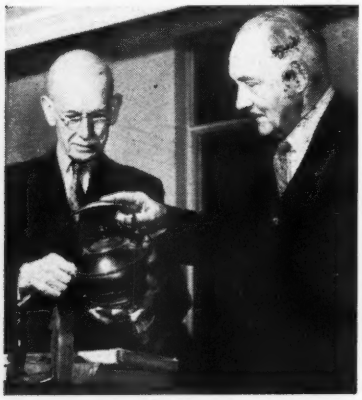
As a result of the assumption of control of Hartley Baird, Ltd., the following changes in direction will take place:—Mr. B. R. A. Homfray Davies, managing director of Camp Bird Industries, Ltd., will become chairman and joint managing director of Hartley Baird, Ltd. Mr. W. Hartley will continue as joint managing director. Mr. R. G. Cooke, the present chairman, will remain a member of the board. Mr. R. M. Fitton will retire from the board but will continue as managing director of Ambassador Radio. Mr. J. W. McFetridge will resign as joint managing director but will remain on the board.

Premier Heaters' Jubilee

It was in April, 1907, that two brothers in Birmingham — Messrs. G. H. Collins and H. F. Collins— commenced making "Premier" electric heaters and irons in a factory in Ashley Street, Birmingham. Electric heating was then looked upon more or less as an interesting experiment. The brothers designed their own equipment and their business progressed; within three years they moved to larger works in Bradford Street. By 1914 this factory had proved to be too small to cope with the flow of orders but during the first world war it was turned over to war work. By the time normal working was resumed two acres of land with canal frontage and road frontages to Keeley Street, St. Andrews Road and Bolton Street, Small Heath, Birmingham, had been secured and in 1921 the first part of the Keeley Street factory was ready for occupation. The firm continued to expand. A power press department was installed, then electro-plating equipment, while Bakelite moulding plant, milling and high speed automatic machines were among many additions to the plant.

Again in 1939 the factory changed over to armament work and during the war the factory was hit several times and more than half of it was destroyed. With the end of the war there was again a period of readjustment.

The Brothers Collins with their first electric kettle; Mr. G. H. Collins is on the left



Apart from war work the firm has throughout its history been devoted entirely to the manufacture of electric heating and electrically heated apparatus. Next month its half-century will be celebrated and although to-day the firm's products are marketed by the Hotpoint Electric Appliance Co., Ltd.—another member of the A.E.I. Group—the main business of the firm was undoubtedly built up by the experience which was acquired in the early years of its existence when almost any proposition requiring heat was undertaken and new design and construction methods were constantly evolved. The brothers Collins started their factory with four employees; to-day the staff numbers nearly 500 and although the two founders have now retired many of the designs produced by them in the early years are still being produced.

Special Alloy Steel Furnaces

Birlec, Ltd., have received an order from Rolls Royce, Ltd., for four Birlec Detroit furnaces, model IC, to be used for the melting of special alloy steels. This is the second order of this type to be placed with Birlec recently; H. & F. Precise Castings, Ltd., Derby, now have a total of seven IC furnaces engaged in the manufacture of turbine root blades for the Ministry of Supply, working to extremely fine limits on special alloy steels.

Packaging of Vitreous Enamel Products

One of the tasks which the newly-formed Vitreous Enamel Development Council is undertaking is the initiation of a programme to improve the packing of vitreous enamelled products to minimise damage in transit. This will be conducted on the line of the safe transit programme adopted in the United States. The essence of the safe transit programme is that close co-operation is maintained between specialist companies manufacturing package materials and the manufacturers of the vitreous enamelled products. Packs designed specifically for a particular product are pre-tested by special machines which simulate the type of conditions most likely to cause damage.

Window Display

Merseyside and North Wales Electricity Board staged a special window display of film projection equipment at its Southport showrooms, to coincide with the change-over of the Garrick Theatre to film entertainment. Arrangements were made by the district commercial manager, Southport, to borrow a Gaumont-Kalee "20" projector and other ancillary equipment similar to that installed in the theatre. This included the "Projectomatic" control panel. After being pre-set, by the operator, the "Projectomatic" automatically controls the running of the show. It opens the curtains, starts the first projector, dims the lights and closes the curtains at the end of the show. The Board was responsible for modifications to the existing electrical installation at the theatre to meet the requirements of the new equipment.

Heat-Treatment Equipment Agreement

Wild-Barfield Electric Furnaces, Ltd., Watford, announces that by an agreement recently concluded with the National Research Corporation of Massachusetts, U.S.A., it is now manufacturing in its works at Watford vacuum melting, heat-treatment and analysing equipment of N.R.C. design.

Polish Television Station Order

An order to the approximate value of £200,000 has been received by Marconi's Wireless Telegraph Co., Ltd., for the supply of a complete television station to Poland. It will be the biggest in that country. The transmitting equipment included in the contract comprises two 7½ kW vision transmitters, two 2 kW sound transmitters, two combining units and one 16-stack high-gain quadrant aerial. The effective radiated (vision) power will be of the order of 200 kW.

Naval Tactical Trainer

A training device, designed by the Engineering and Materials Research Department of the Admiralty and known as the "Action Speed Tactical Teacher," has been installed at the Royal Naval Tactical School, Woolwich. It was formally set in operation on 6th March by the First Sea Lord, Earl Mountbatten.

The "teacher" is an apparatus which, by electrical and electronic means, enables the tactical operation of ships to be reproduced. The installation consists of an auditorium with which are associated a number of cubicles fitted as control rooms to be used to represent surface ships, submarines or aircraft. The control of the exercises is conducted by the staff from the auditorium.

Train Heaters

New type electric heaters manufactured by the General Electric Co., Ltd., are installed in the rolling stock for the Liverpool Street-Southend (Victoria) service. Each heater contains an Alumbro-sheathed element of double-hairpin shape, rated at 500 W, 300 V. The heater is insulated for a voltage to earth of 1,500, secondary insulation being provided in the form of glazed porcelain insulators. An outer casing of 14 gauge mild steel encloses the element and is bolted to the terminal box body, which has a removable top cover for access to the connections. Fixing plates for floor mounting are integral with the

G.E.C. heaters being installed in rolling stock for the Liverpool Street Southend (Victoria) service

terminal box at one end of the heater and with the casing at the other end. The element slides into the casing, in which it is correctly located by guide plates.

The heater is 2ft 3in long and 5½in wide overall at the terminal box end.

Workshop Auxiliary Equipment

The British Thomson-Houston Co., Ltd., has issued a booklet (G.13022) entitled "Workshop Auxiliary Equipment," in which information is given of electrical, mechanical, and electronic aids to productivity, the equipment described being of the kind frequently needed by the works engineer when planning industrial installations.

Irish Cable Contracts

Irish Cables, Ltd. (in association with Wandleside Cable Works and one of the Falks group of companies) has been awarded contracts totalling £150,000 by the Electricity Board for Northern Ireland.

Public Speaking Competition

The finals of the Yorkshire Area of the E.D.A. Public Speaking Competition were held at the Central Electricity Authority's Offices, Whitehall Road, Leeds, on 26th and 27th February. Mr. Arthur Bond, the Board's deputy chairman, opened the proceedings on both days. The first day was devoted to the men's section, the judges being Ald. Mrs. K. Chambers, Mr. J. H. Taylor (deputy chief education officer, Leeds), Mr. Peppino Santagelo (general administrator, New Theatre, Hull) and Mr. J. A. Stedman (education officer, E.D.A.).

The winner was Mr. A. W. Fergusson (civil engineering draughtsman, head office, Scarcroft), whose talk was entitled "The Lady of the Electric Lamp." The second prize was awarded to Mr. R. Carter (senior sales representative, No. 5 (Wakefield) Sub-Area (Doncaster District)), who spoke on "Lighten our Darkness."

In the women's section the judges were Mrs. C. Renton-Taylor (member of the Board), Mr. J. H. Taylor, Mr. F. G. B. Hutchings (Leeds librarian) and Mrs. J. A. Stedman. The winner was Mrs. I. Bird (service centre assistant, No. 5 (Wakefield) Sub-Area (Doncaster District)), who spoke on "The Importance of Clean Air," and the second prize was won by Miss A. Hunt (service centre assistant, No. 6 (Hull) Sub-Area), who also spoke on this subject. The men's prizes were distributed by Ald. Mrs. K. Chambers and the women's prizes by Mrs. C. Renton-Taylor.

Voltage Regulator Order

Servomex Controls, Ltd., has obtained an order for the supply of fifty automatic voltage regulators to the South African Post & Telegraphs Department.

I.E.A. 1958 Exhibition

So great has been the number of potential exhibitors and the advance interest shown throughout the industry in the first Instruments, Electronics and Automation Exhibition to be held at Olympia in May next that it has already been decided to stage the show again next year at Olympia from 16th to 25th April.

Technical State Scholarships

Changes in the arrangements for the award of Technical State Scholarships are announced by the Ministry of Education. In 1957 the number of scholarships to be awarded will be increased from 150 to 225. Applications in 1958 will be considered only from candidates who, for the two previous years, have been engaged in part-time study at establishments for further education; except that students following National Diploma courses will also be eligible; and only from students who have not proceeded beyond Ordinary National Certificate level, or A.1 level in higher national certificate courses, or corresponding levels in other types of course.

The effect of these changes will be to exclude from the scheme in 1958 and later years students who have followed full-time courses leading to G.C.E. (advanced level). In future such students will be expected to apply for ordinary State Scholarships and not Technical State Scholarships; and students who have obtained Higher National Certificates. National certificate students will require to decide at the Ordinary National Certificate stage, or at latest at the A.1 stage, whether they wish to enter for a Technical State Scholarship.

Architects and Electric Lighting

The chair at the first of the 1957 series of conferences for architects held in the lecture theatre of the Lighting Service Bureau, London, on 7th March, was taken by Mr. A. E. Page. He pointed out that the last conferences, held in 1955, had dealt with some of the principles of lighting. This year an endeavour would be made to show how these fundamental principles applied to actual installations. After expressing the thanks of the Bureau to the panel of architects with whose help and advice the programmes had been planned, he introduced Mr. W. R. Stevens, who then gave a paper on "Office Lighting." The next meeting will be held on 14th March when the speaker will be Mr. Derek Phillips and the subject "Lighted and Luminous Features."

Transformers for Dalles Dam

Three Ferranti generator transformers forming a 189,000 kVA, 115 kV, 3-phase bank have recently been shipped to the United States for the Dalles Dam hydro-electric project, Columbia River. These units are part of the contract awarded to Ferranti, Ltd., by the Corps of Engineers in 1955 for eighteen 63,000 kVA, 230 kV, single-phase transformers, and three 63,000 kVA, 115 kV, single-phase transformers. This contract is valued at $2,080,940 (£746,000) and is claimed to be the largest contract so far to be placed in the United Kingdom by the

Three Ferranti transformers being shipped from the Manchester Docks for the Dalles Dam, Columbia River

United States. The transformers are of the oil-immersed, inert gas, FOW type, fitted with off-load tapping switches, and have windings arranged for directed oil flow.

Liverpool Installation Contracts

Committees of the Liverpool Corporation are being asked for their observations on a report which suggests that in future they should consult with the city lighting engineer before awarding contracts for electrical installation work to private contractors, to see whether the type of work could be economically performed by the City Lighting Department.

I.E.S. Northern Meeting

The Scottish and Northern Centres of the Illuminating Engineering Society are combining to hold a meeting at Peebles Hotel Hydro on 3rd and 4th May. The president of the Society will open the meeting and the programme includes two papers—"The Designer's Approach to Decorative Lighting," by Mr. D. W. Durrant, and "The Best Seeing Conditions During Work," by Mr. L. C. Kalff. A tour of the Scott country has been arranged. Further particulars can be obtained from Mr. C. Couper, 76, Brunswick Street, Edinburgh, 7.

Transmission Tower Dispute

In the Chancery Division last week the Central Electricity Authority was granted an *ex parte* injunction by Mr. Justice Roxburgh restraining Mr. Thomas Jones and his son, Bryn Jones, of Willow Farm, Staines, Middlesex, from interfering with or obstructing the Authority in placing or maintaining pylons or electric lines across the defendants' land and from damaging or interfering with the pylons or electric lines. The injunction was granted until Tuesday of this week and the Authority was given leave to serve notice of motion on the defendants for that day.

Mr. G. T. Hesketh, for the Authority, said that the Minister of Fuel and Power granted a consent on 12th December, 1955, authorising the Authority to erect four pylons on the farm. Thomas Jones had made a claim for £330 for damage done to the land in erecting the pylons and the Authority, without prejudice, had offered him £155 3s 6d.

On 4th March Bryn Jones telephoned the Authority and threatened to remove a pylon if the claim were not settled within an hour. The next day he loosened various bolts and, with a sledge hammer, dislodged a pylon from its foundation. The estimated cost of restoration was £1,282.

Last Monday a summons was served on Mr. Bryn Jones at the instance of the C.E.A. alleging unlawful and malicious damage to an electricity tower. The summons is returnable at the Feltham Magistrates Court on Monday next.

Advertisement Correction

In the North Eastern Electricity Board's advertisement for fourth assistant distribution control engineers which appeared in our 8th March issue, "operation of section" in the first paragraph should have read "operation of sections" and "Schedule G" in the third paragraph should have been "Schedule B."

Trade in Natural Rubber

A booklet entitled "The Trade in Natural Rubber" which has been compiled by Mr. F. R. Horridge is of interest to all who are concerned with natural rubber in that it covers, in a concise form, all stages in the industry from plantation to user, and gives an account of the rubber market and its operations. The booklet is published at 3s, post free, by the Purchasing Officers' Association, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4.

Calendar

The 1957-58 calendar received from the Parolle Electrical Plant Co., Ltd., shows two months on each sheet, and has six attractive pictures in colour of scenes in the Lake District.

Industrial Films

The Central Film Library, Government Building, Bromyard Avenue, Acton, London, W.3, has issued an up-to-date list of industrial films on free loan. These include a number on electrical and electronic subjects. In addition to films on specialised subjects, the Library has a list of films of a more general nature. The "Films for Industry" catalogue and supplement, containing details of 693 films and 57 strips, is obtainable from the Library, price 2s post free.

Consulting Engineers' London Office

R. W. Gregory & Partners, consulting engineers, have opened an office in London at 54, Bloomsbury Street, W.C.1 (telephone: Museum 2287). The office is in charge of one of the partners, Mr. F. E. Heppenstall, B.Sc., M.I.E.E., M.Cons.E. The senior engineer is Mr. C. Swinburne, A.M.I.H.V.E., who has been for several years a senior designer with a firm of heating, ventilating and air-conditioning engineers.

Trade Announcements

The sales offices and order departments of the south-eastern region of **Philips Electrical, Ltd.,** have been transferred to the new south-eastern regional headquarters at 1, Gerrard Place, London, W.1 (telephone: Gerrard 9941; telegrams: Philsales Lesquare London). The new sales depot and trade counter entrance will be situated in Horse and Dolphin Yard, Macclesfield Street, W.1.

Mr. Geoffrey Stott has been appointed sales engineer at the Glasgow office of **Brook Motors, Ltd.** Mr. Stott was a Brook apprentice and he has had nine years with the company, completing his training in the Production Planning and Estimating Departments followed by a period in the Huddersfield sales office.

The **Ransome & Marles Bearing Co., Ltd.,** has removed its Glasgow area office to 378-380, Argyle Street, Glasgow, C.2 (telephone: Glasgow Central 3948).

The **Sun Electrical Co., Ltd.,** has been appointed authorised distributor of Dexion slotted angle.

Mr. J. Fitzclark has joined the sales staff of **Alliance Wholesale, Ltd.,** 15-17, Bute Street, Luton.

Representatives and area sales managers at the head office of Ekco-Ensign, Ltd., 45, Essex Street, Strand, London, W.C.2, during a recent two-day conference under the chairmanship of Mr. E. S. Evans, general manager

PARLIAMENTARY REPORT

IN an economic debate in the House of Lords, Lord Crookshank said he had recently visited the Snowy Mountains project, one of the greatest engineering schemes in the world. While it was true that Britain had succeeded in getting some of the contracts for one of the power stations, there had been ten civil engineering contracts and Britain did not get one.

Three major contracts were coming forward for tender this year; one was for a power station, one for a dam and one for a three-mile tunnel. Probably one of the causes of Britain not getting contracts was our lack of resources; the rate of development of atomic energy and of the nationalised industries had exhausted the resources available to British engineering firms. The Government should consider how much it would help the economic situation for Britain to go into this project, if for no other reason than to save the dollar expenditure involved when American firms succeeded in getting the contracts. The Government ought to review more carefully the expected use of capital in the next few years so that money could be made available for this kind of work.

Exports to China

In reply to Viscount Elibank, Lord Mancroft, Parliamentary Secretary, Ministry of Defence, gave a list of embargoed goods for which export licences for China had been issued since 14th May, 1956. This included small generating sets and generators, electric motors, circuit-breakers, transformers, voltage regulators, switchgear, battery charging sets, meters, fuses, welding equipment, small electric furnaces, and portable power tools. The only goods of this kind for which export licences had been refused for China since that date had been certain electrical generators.

Supply of Electrical Machinery and Plant

Mr. Jay asked the President of the Board of Trade what action the Government proposed to take arising out of the report of the Monopolies Commission on the supply and export of electrical and allied machinery and plant.

Sir David Eccles said he had invited the industry's comments on the conclusions in the report and he would decide what action to take after he had received them.

Pension Increases Retrospective

Dame Irene Ward asked the Paymaster General whether the increased pensions for ex-employees of the electricity and gas industries would be retrospective to 1st April, 1956, in view of the fact that they were analogous to the Pensions Increases Act, 1956, which carried this provision.

Mr. Reginald Maudling replied that they would.

Tenders for Nuclear Power Stations

Mr. Palmer asked the Paymaster General what action would be taken to ensure that contracts for plant and equipment in connection with the expanded nuclear power programme would be awarded to manufacturing firms under genuinely competitive conditions. Would the Minister take into account the recent report of the Monopolies Commission on some of the practices of the electrical manufacturing industry in relation to restrictions?

Mr. Maudling said that at the moment the tendering for these nuclear power stations was extremely competitive.

Asked by Mr. Albert Roberts if he would put out the building of the proposed new nuclear power stations to open tender, Mr. Maudling replied that the tendering for the stations was a matter for the electricity authorities. He understood, however, that they intended to place contracts on the basis of the widest possible competition.

Mr. Albert Roberts asked how many contractors would be able to tender for the building of these stations.

Mr. Maudling said there were four groups in existence and others were being formed. That would be sufficient to provide an active range of competition for these stations. The House must remember that this involved starting up a completely new industry on a very large scale.

Replying to Mr. Palmer, the Paymaster General said that the prospective availability of steel supplies was taken fully into account in framing the nuclear power programme, and the Minister of Power intends to keep the position under constant review in consultation with the Iron and Steel Board and the electricity authorities.

Nuclear-Powered Submarine

In the debate on the Navy estimates, Capt. C. Soames, Financial Secretary, Admiralty, said that an order had been placed with Vickers-Armstrongs (Shipbuilders), Ltd., for the construction of a prototype nuclear-propulsion submarine and the design was well advanced for the construction by Vickers-Armstrongs (Engineers), Ltd., of a prototype reactor and machinery installation. This would be fitted for test purposes into a portion of a submarine hull ashore and the Atomic Energy Authority had undertaken to be responsible for the construction of the installation and for reactor safety. Engineering problems would be tackled by the Navy's team of contractors, including Rolls-Royce and Foster Wheeler, as well as Vickers-Armstrongs, naval experts and Admiralty scientists. The name "Dreadnought" had been approved by the Queen for the first British nuclear submarine.

In the distant future all major warships would probably be powered in this way and the whole tempo of naval operations would be altered. As the cost of nuclear fuel fell it would become economically attractive for commercial vessels and he had arranged for a committee to be set up, under the chairmanship of the Civil Lord, to bring together all the interests concerned.

Technologists and Atomic Power

Mr. B. T. Parkin has given notice that on 22nd March he will initiate a debate on the need to increase the number of scientists and technologists in view of the expanded programme for the development of atomic energy.

Use of Low-Grade Fuel

Mr. Maudling informed Mr. A. Roberts that the electricity demand was rising so fast that the coal consumption of the thermal power stations would not decrease during the next ten years despite the recently announced acceleration of the nuclear programme. How best to use inferior coal in the longer term was a question that was already under close study.

Investment in Primary Energy Sources

Mr. Palmer asked the Paymaster General if he would make available figures showing proposed relative national investment over the next ten years in all primary energy sources in the light of the nuclear power programme now announced.

Mr. Maudling said investment in nuclear power stations was expected by the end of 1965 to total rather more than £1,000 million. Investment in hydro-electric power in Scotland might, if present progress was continued, amount to some £120 million. Colliery development by the National Coal Board was estimated at some £850 million over the same period.

Rural Electrification

In answer to Sir Ian Fraser, Mr. Maudling said he was informed by the C.E.A. that the Area Electricity Boards estimated that during the financial year ending on 31st March they would have connected 12,500 farms and some 40,000 houses in rural areas. The capital investment programme of the Electricity Boards for the next financial year has not yet been approved. The five-year programme adopted in 1953 looked like being exceeded in practice.

GENERATION AND DEVELOPMENT

Higher "Unit" Charge in Eastern Area

The Eastern Electricity Board announced last Friday that new tariffs would be fixed at the end of the month which would reflect the heavy increases in the price of coal borne by the Board. By the time the new charges came into operation on the first normal meter reading after 1st July the present tariffs would have been unaltered for two and a quarter years. This tariff "freeze" had been maintained in keeping with the Government's policy to stabilise prices despite the substantial increases made in coal and freight charges in July, 1955, and the further coal increases in June, 1956. In addition there had been increases in salaries and wages and other costs. In all, £1·5 million more than had been estimated was added to the Board's outgoings, leading to an anticipated deficit in the present financial year.

As far as domestic consumers were concerned the general effect of the new tariffs would be that the fixed charge on the two-part rates would remain unchanged but the "unit" charge would be increased from 1d to 1¼d. Comparable adjustments would be made in the tariffs applying to farms, commercial and industrial premises, etc. No change would be made in the first step in the block rates, so that consumers who used only small quantities of electricity would pay the same price as before.

It was also announced that additional provision would be made in the Board's charges to cater for the needs of residential homes, hotels, etc., with off-peak usage. Under this a special cheap rate would apply to consumption during the night and week-ends. Mr. C. T. Melling, the Board's chairman, explaining the "week-end" rate to Press representatives, said that it was an extension of the off-peak tariff and was the first of its kind. It would involve a slightly more complicated time switch.

No Price Increases Yet in East Midlands

Mr. C. R. King, chairman of the East Midlands Electricity Board, informed the Electricity Consultative Council at its meeting at Nottingham last week that although costs had increased by nearly £1¼ million during the current financial year, the Board had not as yet reached any decision regarding a possible increase in tariffs following the "price freeze" which had operated since March, 1956. It was almost certain that in the East Midlands tariffs would not be altered before October next.

Mr. King pointed out that the Board was working on the narrowest of margins and that electricity sales would probably not be as high as anticipated owing to short-time working in certain industries and the exceptionally mild winter. While the Board might even have to call upon its reserve funds in order to balance its accounts in March, it considered that these reserves, small though they were in relation to the total turnover, had been created for the purpose of avoiding unnecessary and frequent variations in the tariffs.

The Council expressed satisfaction with the Board's statement.

Mobile Generators

At the same meeting the East Midlands Consultative Council considered the comments of the Board on the suggestion made at the previous meeting concerning the possible use of mobile generators to maintain continuity of supply during planned shutdowns of parts of the Board's networks and to mitigate the effects of any prolonged breakdowns.

The Council was pleased to learn that the Board was now considering the purchase of two small mobile generators to enable essential supplies of electricity to be maintained when lines were taken out of circuit for repairs or alterations. It was emphasised, however, that if these generators were obtained, they would be mainly for use in rural areas and then only where continuity was essential. There would be many places where their use was not practicable. An assurance was given that as far as possible supply interruptions would be arranged to cause the minimum inconvenience to consumers.

Atomic Station for Ulster

Lord Glentoran, Minister of Commerce, announced in the Ulster House of Commons on 5th March that a £25 million atomic power station, which should be in operation by 1963 or 1964, was to be built in Northern Ireland. He added that in view of this plan the Government had decided not to proceed with the Bann and Mourne hydro-electric schemes.

Lord Glentoran said that the new atomic power station would be under the control of the Electricity Board for Northern Ireland, who would train three engineers to take charge of it. The station's total output when it was fully commissioned would be 150 MW, which would be about 20 per cent of the Province's needs.

One significant aspect of an atomic power station in Northern Ireland would be that it would reduce the area's dependence on imported fuels which at present add considerably to industrial costs. Lord Glentoran said that the proposed new station would be built on an inland rather than on a coastal site and that the site "would be selected with a view to the most economical use that can be made of the station."

Cheaper Immersion Heater Installations

The third reduction in four years in the cost of immersion heater installations has just been made by the North Western Electricity Board. In 1953, as a result of negotiations with manufacturers, the Board brought down the cost of installing a standard immersion heater in domestic premises from £20 to £15. The following year this was further reduced to £13 15s. Now, as a result of economies made possible by the large numbers being supplied, the Board is bringing the price down to £13.

The installation includes fixing and plumbing into an existing sound hot water cylinder, supplying and fixing a lagging jacket, and the wiring of a necessary separate circuit up to a cable length of 50ft. For fitting to an existing circuit the cost is £8, including lagging jacket, plumbing and connection. This has been reduced from £8 15s. The heater offered in the scheme is a "streamlined" article, highly efficient but without unnecessary "trimmings."

The Board has inaugurated a publicity campaign in North Western newspapers to announce the reduction.

Turbo-Alternators for Padiham "B"

The British Thomson-Houston Co., Ltd., has obtained an order valued at more than £1½ million for two 120,000 kW c.m.e.r. turbo-alternator sets for the new Padiham "B" power station of the Central Electricity Authority (North West, Merseyside and North Wales Division). The turbines of these sets are to be designed to operate under steam conditions of 1,500 p.s.i.g. at a temperature of 1,000 deg F with reheat to 1,000 deg F. The alternators will be hydrogen cooled. These turbo-alternator sets will be made in the company's new turbine factory at Larne, Northern Ireland, and are to be ready for commercial load during the 1961 and 1962 commissioning programmes, respectively.

Heckmondwike "Sabotage"

Heckmondwike Urban Council was informed recently that the amount of damage done to street lamps in Heckmondwike had become so bad that at one spot in the town recently a whole lamp completely disappeared. The chairman of the Council, Councillor C. W. Barnes, stated that no fewer than twelve bulbs had been fitted to one lamp within a fortnight

and six bulbs had been fitted in another lamp in a week. He said he had previously referred to the damage done as vandalism, but he felt that word was no longer strong enough. It was more like sabotage. Repairs to fittings had cost the Council between £130 and £150 last year.

Amalgamation of Districts

The North Western Electricity Board has decided to merge four Cumberland and Westmorland Districts in its No. 6 Sub-Area. They are Whitehaven, Workington, Barrow and Kendal, and the change-over comes into operation on 1st April. Later it is proposed to amalgamate the Carlisle and Penrith Districts. The changes have been made in the interests of efficiency and economy.

OVERSEAS

Power Production in Sicily

Electricity production in Sicily has expanded at a somewhat greater rate than on the mainland and the 1955 total of 810 million kWh was nearly four times as much as the pre-war output. According to preliminary figures, consumption in Sicily in 1956 amounted to 940 million kWh of which about 8·5 per cent was obtained from the mainland by way of the new transmission line across the Messina Strait.

This year the third unit of the Societa Termoelettrica Siciliana in Palermo will start producing at the rate of 150 million kWh a year and a further 50 million kWh will be generated by several new plants of Ente Siciliano Elettricita. Early in 1958, production will commence at Tifeo Central in Augusta and this will add about 800 million kWh yearly.

Vietnam Water-power Schemes

A United Nations commission is to advise the Government of Vietnam upon two schemes which have been put before it for developing the water power in the Danhim Valley at a cost of about $30 million. One plan has been submitted by Japanese interests and the other by the Société Grenobloise d'Etudes et d'Applications Hydro-électriques on behalf of the French technical aid commission to Vietnam. The French plan provides for the construction of two dams and the development of 180 MW.

Higher Canadian Output

Production of electrical energy by Canada's central electric stations rose by well over 10 per cent in 1955 (to 72,910·6 million kWh from 65,936·5 million kWh in 1954), according to the annual report of the Bureau of Statistics. Total sales to ultimate customers in Canada increased from 56,537·4 million to 61,341·5 million kWh, sales to domestic and farm consumers accounting for 12,759·6 million kWh (11,280·5 million kWh).

E.D.A. Sales Conference

Between 700 and 800 representatives of the various Electricity Boards in the United Kingdom will attend this year's E.D.A. Annual Conference for Electricity Boards' sales staffs. The conference will be held in London from 9th to 12th April and the sessions on the first three days will take place at the Caxton Hall, Westminster, the meeting on the fourth day being at the Connaught Rooms, W.C.2. The opening address on Tuesday (9th April) will be given by Viscount Chandos, president of E.D.A. This will be followed by a paper on "The Domestic Consumer" by Mr. D. Bellamy (chairman, Yorkshire Electricity Board). In the afternoon Mr. T. E. Daniel (chairman, North Western Electricity Board) will speak on "Increased Cooker Sales."

The subject of Wednesday's proceedings will be "Developing the Domestic Water Heating Load." It will consist of four papers, the chairman for this session being Mr. W. A. Gallon (deputy chairman, South Wales Electricity Board). Mr. E. H. Skinner, M.I.E.E. (chief commercial officer, South Eastern Electricity Board) will present the first paper, on "The Potential Field," and this will be followed by "Improvement of Load Factor," by Mr. E. M. Ackery (E.D.A.). Mr. R. McInnes (representing B.E.A.M.A.) will speak on "A Manufacturer's Point of View," and the final paper, "Selling Methods," will be given by Mr. L. Shepherd (Eastern Electricity Board).

On Thursday the morning session will be devoted to a talk on "Home Laundry," by Miss Ena M. Eaves (E.D.A.). Mr. D. B. Irving (chairman, London Electricity Board) will be the chairman. A joint paper will be presented in the afternoon, under the chairmanship of Mr. T. Coates (deputy chairman, North Western Electricity Board). Its title is "Building the Industrial Load," and the authors are Mr. N. Axford and Mr. F. A. Hitchcock (manager and deputy manager, respectively, Plymouth District, South Western Electricity Board).

There will be a general discussion, opened by the director of E.D.A., at the Connaught Rooms on Friday morning, and this will be followed by the conference luncheon.

Industrial Development Centre

Addressing representatives of industries which pay the Merseyside and North Wales Electricity Board about £12 million a year for electricity, Mr. D. H. Kendon, chairman of the Board, stated at a luncheon to mark the opening of a new industrial development centre at Paradise Street, Liverpool, that that sum was about half the Board's income for substantially more than half the output of electricity.

Over the last ten or fifteen years the great increase in the use of electricity in industry was for purposes other than motive power—such as welding, process heating and in the chemical and oil refining industries. Manweb's sales of units to large industries were distributed something like this:—Chemicals and oil refineries 40 per cent, heavy engineering 20 per cent, glass 20 per cent, mining and quarrying 5 per cent, and miscellaneous 25 per cent.

The purpose of the industrial electricity development centre was to collect together and show examples of the latest apparatus so that any industrialists wanting to know of developments could come to Manweb for the information.

This industrial service centre is accommodated in an old battery room on the upper floor of a substation building, and the opening display included the manufactures of the Metropolitan-Vickers Electrical Co., Ltd.; G.E.C.; Wild Barfield Electric Furnaces, Ltd.; Radio Heaters, Ltd.; the English Electric Co., Ltd.; Thorn Electrical Industries, Ltd.; M. K. Electric, Ltd.; Crompton Parkinson, Ltd.; British Thomson-Houston Co., Ltd.; Sargrove Electronics, Ltd.; Calidec, Ltd.; Woods of Colchester, Ltd.; British Insulated Callender's Cables, Ltd.; and Lancashire Dynamo Electronic Products, Ltd.

Electro-Oculography

For some time past the Psychological Research Laboratory of E.M.I. Electronics, Ltd., has been investigating electro-oculography, the technique of electrically recording eye position and movement by detecting the resulting small d.c. potentials from the skin surface around the eye sockets. As a result, a practical and complete system of eye movement measuring apparatus has been developed, the first of which will be used by the Naval Motion Study Unit of the Admiralty Research Laboratory.

The purpose of electro-oculography research is to provide the basic scientific data from which may be evolved, in due course, a new approach to methods of improving visual efficiency and reducing or eliminating eyestrain and fatigue, particularly of industrial and other workers engaged on exacting visual tasks.

NEW ELECTRICAL EQUIPMENT

Switches and Sockets

The latest accessories to be announced by VOLEX ELECTRICAL PRODUCTS, LTD., Salford, 6, are a "boxless" mounting for switches and sockets and a 13 A three-pin socket conversion unit.

The first of these two items has been introduced to solve the problem of fixing switches and sockets in dry partition interior walls. The principle used is an adaptation of bayonet fixing but allows the accessories to be fitted to varying thicknesses of walls. Attachments are available for one- or two-gang brown or cream switches (BF/1 and BF/1CR) and brown or cream sockets (BF/2 and BF/2CR), price 12s 4d per dozen.

The conversion unit consists of a two-gang pattress and metal plate for earth continuity and will fit any type of installed flush 13 A box. It is a simple method of fitting a two-gang socket outlet to replace an existing one-gang flush outlet without damage to the decorations or alteration to existing wiring. The unit can also be used to convert one- and two-gang flush switches of the Volex V/501 range without changing the box. For use with sockets the units cost £1 9s 4d per dozen (brown) and £1 16s 4d (cream), and for use with three- or four-gang switches, £1 0s 8d (brown) and £1 6s 4d (cream).

Wattmeter Bridge

The CLARE INSTRUMENT CO., 8, South Street, West Worthing, Sussex, offers a comprehensive test station, incorporating all the necessary electrical tests, in a single unit having one set of terminals for the equipment under test and press-button control of its various functions. These test stations may incorporate a Q108 limit bridge, a Wheatstone bridge, an R114 earth leakage indicator and also a load test at either full or reduced voltage.

Suspension Heater

The "Multirod" suspension heater announced by HEATRAE, LTD., Heatrae Works, Norwich, is an industrial development of the company's well-known "Saferod" domestic heater. It is designed for suspension fitting and is intended for installation in large rooms, halls, workshops, etc. It has a wide radiant heating zone. The long-life metal sheathed elements can be arranged for balancing on three-phase, four-wire supplies. The loading is 3 kW.

The reflectors are of anodised aluminium, which remains unaffected by normal atmospheric conditions, thus helping to reduce maintenance costs. The total weight is 14 lb and the complete unit measures 28in long by 12in high by 9in wide. The price, without chains, is £11.

Dry Shavers

Two additional "Philishave" electric dry shaver models are now available from PHILIPS ELECTRICAL, LTD., Century House, Shaftesbury Avenue, London, W.C.2.

The new standard model is in appearance and general construction identical to the dual-voltage model, but operates on one voltage range only —200/250 V a.c./d.c. The shaver is supplied with cleaning brush and standard two-pin 5 A plug. Other types of plug can be fitted as desired. The shaver is packed in a neat tan plastic pouch, with zip fastener, and the price is £5 11s 7d plus £1 5s 11d purchase tax in the United Kingdom.

To complete the range of three shavers, a new model of the battery-operated "Philishave" has also been introduced. Three 1½ V torch batteries, housed in a small container, drive a 4½ V motor providing power for 200 shaving minutes. The shaver, battery box (which incorporates a non-breakable mirror) and cleaning brush are finished in maroon and are packed in a rubber-lined, tartan-covered travelling pouch. The price is £6 4s plus £1 8s 6d purchase tax.

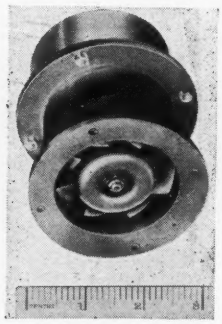
Miniature Cooling Fan

A small 400 c/s axial-flow fan of high performance has been produced by WOODS OF COLCHESTER, LTD., for airborne applications, chiefly for cooling electronic apparatus. It is a downstream guide vane fan, with an impeller of 2·4in diameter and an overall length of 3⅝in, the weight being under 1 lb.

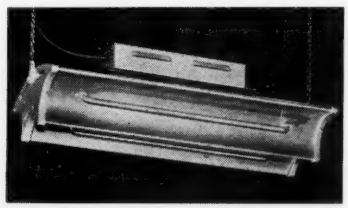
The fan motor is a totally enclosed squirrel-cage machine which has a diameter of only 1·6in. Running at 11,000 r.p.m., it consumes 15 W and will move 30 cu ft/min at a static pressure of 0·8in w.g. A 22,000 r.p.m. type is being developed and this will have an output of 50 cu ft/min at 3in w.g. for the same weight.

The guide vanes and motor carcase

Clare wattmeter bridge



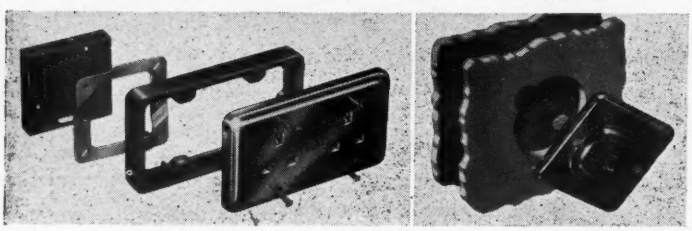
Woods 2·4in 400 c/s fan



Heatrae "Multirod" suspension heater

Philips standard model "Philishave" dry shaver

Volex 13 A conversion unit (left) and "boxless" mounting fitting



are integral with the diecast casing. The impeller is a plastic moulding with aerofoil section wings. The rotor shaft is carried in single shield ball bearings at each end, the bearings being spring loaded axially to ensure quiet running. The motor is rated for 1,000 hours' continuous operation in an ambient temperature range of −40 deg to +80 deg C.

High Speed Stroboscope

Preliminary information has been received from the manufacturers of a new high speed electronic stroboscope which, by using up to the fourth harmonic, enables observation to be made up to 160,000 r.p.m. This mains-driven instrument is suitable for holding in the hand and can be used for the measurement of shaft or spindle speeds and for the observation of cyclic operation of moving parts of machinery, such as the behaviour of high-speed bobbins in the textile industry. The instrument will be available in April and will be priced at approximately £50. The manufacturers are DUKES & BRIGGS ENGINEERING CO., LTD., of Altrincham, Cheshire.

Insulated Screwdriver

An insulated screwdriver, designed to simplify the task of replacing fuses, has been introduced by J. STEAD & CO., LTD., Manor Works, Cricket Inn Road, Sheffield, 2. This, the "Fusedriver," is a robustly constructed tool and measures just under 6in in length. It has a transparent shock-proof hollow handle which contains a spool on which is wound 5, 10 and 15 A fusewire. The screwdrivers are supplied on an attractive card containing one dozen. The price of a single implement is 2s 9d.

Convector Heater

The latest addition to the range of electric convector heaters manufactured by L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, Kingsway, London, W.C.2, is the 1 kW "Sunray." It is particularly suitable for use in bedrooms or halls, combining warmth with concealed lighting through a specially designed gold coloured grille of the Venetian blind style. The convector measures 21in high by 13in wide by 6in deep and the price is £4 12s 3d plus £2 0s 6d purchase tax in the United Kingdom.

Gun Welding Equipment

The new range of portable gun welding equipment introduced by PHILIPS ELECTRICAL, LTD., Century House, Shaftesbury Avenue, London, W.C.2, employs a wall-mounted ignitron contactor/timer unit, measuring only 30in square by 10in deep, which houses two thermostatically-controlled ignitrons and a four-function timer which can be pre-set to control squeeze delay, weld-, hold-, and off-times. Standard units have a single timer, but two can be fitted to provide independent control for dual gun operation from the same transformer. Water-cooled, double-turn secondary type transformers are employed of either 30, 40 or 60 kVA rating, together with all the necessary ancillary components. These are interchangeable between the three sizes of assembly.

The equipment is primarily for use with Philips guns, which are available with a wide range of yokes up to 30in throat depths, with 1in, 2in and 3in stroke, and with either single or double-acting cylinders. However, any standard spring or air-return type gun can be used. All necessary leads, hoses and connections are provided, and the company can also supply a four-wheel, half-ton trolley and a spring balance for suspending transformer assembly and gun respectively.

Telephone Dialling Machine

An automatic telephone dialling machine designed to give warning of a fault or breakdown in an essential service in unattended premises, using existing public telephone lines, is available from the AUTO CALL CO., LTD., Security House, 40-42, Parker Street, Kingsway, London, W.C.2. It is operated by a 12 V accumulator and arranged to call out to a control room from the unattended premises where it is installed over the normal public telephone system.

The machine may be fitted on fully automatic, dial "O" or manual exchange, and the message is passed from a wax recording, giving the information required by the control room. This message is repeated for a period of four minutes, so as to give ample time for it to get through and to be received and understood by the control room operator. At the end of this message, the machine closes down, releases the telephone line and automatically resets for the next operation.

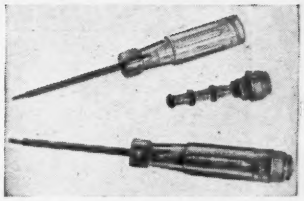
On receipt of the message, the control room operator has only to telephone back to the number given on the recording, and the machine will acknowledge his call, cancel all further messages and automatically reset. The equipment is fully approved by the General Post Office.

Lightweight Counter

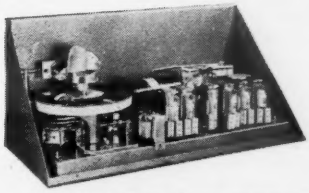
The Type 54/4 lightweight high speed electro-mechanical counter manufactured by COUNTING INSTRUMENTS, LTD., 5, Elstree Way, Boreham Wood, Herts, consists of a series of moulded number wheels and pinions giving a display from 0000 to 9999. It is driven from a balanced escapement mechanism set in jewel bearings and energised by one or more electromagnets spaced around a common armature.

The operating voltage is from 22 to 29 V d.c. and the counter will operate on pulses of 10 millisec at a maximum rate of 37 per sec.

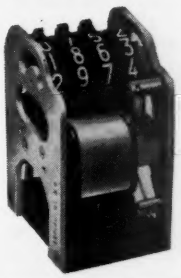
The counter, which has been subjected to 7 G in two directions and maintained an accurate count, weighs only 1·1 oz and is therefore suitable for use in aircraft.



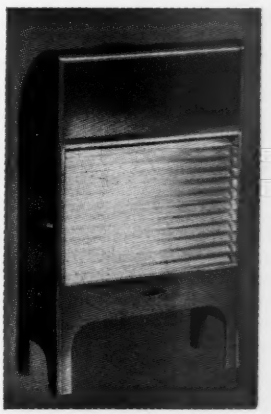
Stead "Fusedriver" insulated screwdriver



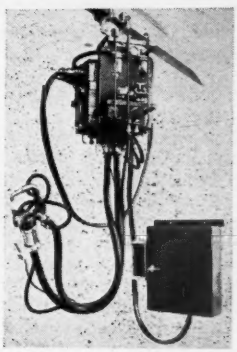
Auto Call telephone alarm equipment



Counting Instruments' lightweight electro-mechanical counter



Hawkins 1 kW "Sunray" convector



Philips gun welding equipment

Financial Section

STOCKS and SHARES

A SUCCESSION of big capital issues is at present making large calls upon the cash resources of institutional and private investors. In diverting business away from normal investment channels it is tending to take some of the life out of Stock Exchange markets for the time being. While corporations and other public bodies have been competing for new money on the gilt-edged plane, the industrial market has been called upon to absorb recently such issues as the £40 million I.C.I. loan stock, a £15 million loan of similar character from Bowater Paper Corporation, supplemented this week by the £40 million Steel Company of Wales offer, apart from numerous smaller-scale operations such as the Decca "rights" issue of shares. In the circumstances, it is not surprising that markets have been showing signs of mild indigestion, especially at a time when their vitality is being affected also by the recent by-election results and by the labour situation in the shipyards.

Electrical Equipment

The market in electrical and "atomic" engineering shares has not been immune from the influences making temporarily for sluggish conditions among industrials in general. Nevertheless prices have been upheld more firmly than in other sections, with the aid of the news published during the past week or so about progress with both the nuclear power and the railway modernisation programmes. Sentiment could scarcely fail to be impressed by the latest figures of £919 million to be spent on the nineteen nuclear power stations by 1965; or by the report that over one-third of the £1,200 million railway re-equipment expenditure has already been committed or authorised, including £92 million for electrification works, and that the latter might be wholly completed well before 1970.

Clarke Chapman Results

A further rise of 5s to 145s in the price of Clarke Chapman £1 shares, since the publication of the annual results, consolidated one of the best performances in the industrial market over the past twelve months. At the corresponding time last year the quotation was more than 50s below the present level. Since then the shares have of course become connected with the future of nuclear power through the company's association with the Parsons-Reyrolle group in the Nuclear Power Plant Company. In the past decade the consistently successful expansion of the business has enabled the company to make a succession of moderate increases in the ordinary dividend, while retaining all the time by far the greater part of the profits to finance continued development. On this occasion the distribution is being raised from 22½ to 27½ per cent, the amount of which still appears, from the preliminary statement, to be covered

Price Changes in

Company or Board	Nom. Value	Middle price 11th Mar.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1957 Highest	1957 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	78⅛		3	3	3 16 6	80	75
Brit. Elec. 1974/77	100	76½		3	3	3 18 6	78⅛	73½
Brit. Elec. 1976/79	100	81½		3½	3½	4 6 0	81½	77⅛
Brit. Elec. 1974/79	100	90½	—1	4¼	4¼	4 14 0	92½	87⅛
Overseas Electric Supply								
Calcutta Elec.	£1	18/6		6†	6†	6 9 9†	19/-	18/3
East African Power	£1	20/-		7	7	7 0 0	20/6	19/3
Nigerian Elec.	£1	17/6		10	10*	11 8 6	18/6	17/3
Perak Hydro-Elec.	£1	14/9		10	10*	13 11 3	14/9	13/3
Equipment and Manufacturing								
Aberdare Cables	5/-	11/3		17½	17½	7 15 6	11/3	9/9
Aerialite	1/-	5/9		45	48	8 7 0	6/-	4/9
Allen, W. H.	£1	38/3		20	10*	5 4 6	39/-	33/6
Aron Elec. Ord.	£1	56/3	+1/3	15	15	5 6 9	55/6	53/6
Assd. Automation	10/-	20/3		10	5	2 9 6	20/9	17/9
Assoc. Elec. Ord.	£1	65/-		15	15	4 12 3	73/-	64/-
Automatic Tel. & El.	£1	58/9	—1/3	15	15	5 2 3	60/-	54/6
Babcock & Wilcox	£1	80/-	—2/6	15	15	3 15 0	82/6	71/6
Baldwin, H. J.	2/-	4/6		20	20	8 17 9	5/-	4/-
Bakelite	10/-	21/3		16	16	7 10 6	21/9	20/9
Berry's Electric	5/-	5/9		—	10‡	8 14 0	5/9	5/6
British Aluminium	£1	67/6	+2/6	12	12	3 11 0	70/6	63/9
B.I. Callender's	£1	50/3	+6d	10	12½	4 19 6	51/6	48/3
B.I. Callender's 6% Pref.	£1	21/9		6	6	5 10 3	21/9	20/6
British Tabulating	£1	49/6	+9d	9	9	3 12 0	50/-	42/-
British Thermostat	5/-	27/6	+1/3	20	25	4 11 0	27/6	25/9
British Vac. Cleaner	5/-	7/-	+6d	30	15*	10 14 3	8/-	6/6
Brook Motors	10/-	31/3	—1/3	25	25	8 0 0	33/3	30/-
Brush Group	5/-	5/6	—6d	10	10	9 1 9	6/3	4/6
Bulgin, A. F.	1/-	5/6	+3d	50	40*	7 5 6	5/6	4/6
Burco Dean	5/-	11/3		22½	20	8 17 9	11/-	8/9
Chloride El. Storage "A"	£1	67/-	—6d	17½	17½	5 4 6	68/-	58/-
Clarke Chapman	£1	145/-	+5/-	22½	27½	3 15 9	7½	6½
Cole, E. K.	5/-	19/-	—6d	17½	17½	4 12 0	19/6	16/6
Cossor, A. C.	5/-	6/6	—3d	15	Nil	Nil	7/3	5/9
Crabtree	10/-	25/-		20	20	8 0 0	25/6	23/3
Crompton Parkinson Ord.	5/-	16/3		16	16	4 18 6	17/9	14/6
De La Rue	5/-	18/3	—3d	30	30	8 4 6	19/9	16/3
Decca "A"	4/-	27/-	—6d	43⅞	43⅞	6 9 9	32/3	27/-
Desoutter	5/-	29/6		30	32½	5 10 3	29/-	27/6
Dewhurst	2/-	6/9	—3d	30	16¼*	4 16 3	7/6	5/9
Dictograph Tel.	2/-	7/6		20	20	5 6 9	7/6	6/9
Dubilier Condenser	1/-	5/3		25	30	5 14 3	5/9	5/6
Duport	5/-	18/9	—3d	23	25	6 13 3	19/6	17/6
E.M.I.	10/-	27/9	—6d	15	15	5 8 0	29/6	23/9
Electrical Components	5/-	7/3		25	25	8 12 6*	7/3	6/6
Elec. Construction	£1	25/-		8½	8½	6 16 0	25/6	21/9
Elliott Bros.	5/-	27/6	—1/3	17½	20‡	3 12 9	29/-	26/3
Enfield Cable Ord.	£1	16/3		Nil	Nil	Nil	21/6	13/-
English Electric	£1	58/9		12½	14	4 15 3	58/9	47/6
English Electric 3¾% Pref.	£1	13/6		3¾	3¾	5 11 0	14/3	13/3
Ericsson Tel.	5/-	41/-	+6d	20†	22†	2 13 9†	41/-	33/3
Ever Ready	5/-	30/9	+3d	35	35	5 13 9	31/9	30/-
Falk Stadelmann	£1	38/6	+3d	17½	17½	9 1 9	38/6	35/-
G.E.C. Ord.	£1	56/3	—1/3	12½	14	4 19 6	57/9	48/9
G.E.C. 6½% Pref.	£1	23/-		6½	6½	5 13 0	23/6	22/-
General Cables	5/-	12/9		30	30	11 15 3	13/6	11/6
Greenwood & Batley	£1	46/3		17½	17½	7 11 3	46/3	45/3
Hackbridge Holdings	5/-	20/3		25	30	7 8 3	21/-	19/9
Hackbridge & Hewittic	5/-	15/-		30	23*	7 13 3	16/-	13/6
Heatrae	2/-	4/-		15	15	7 10 0	4/-	4/-
Henley's	10/-	17/-	+6d	10½	11½	6 15 3	17/-	15/3
Holophane	5/-	23/-		30	30	6 10 6	26/3	17/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

very amply by the increased earnings of 1956.

Rheostatic Dividend

Rheostatic 4s ordinary shares were maintained at a price of 10s after the declaration of a final dividend of 7½ per cent for the year ended in September of last year. This makes a total of 12½ per cent on capital doubled, to £739,000, by the cash issue of shares in the previous May, and is a half per cent above the rate forecast at that time. For 1955–56 the payment on £369,000 capital was 18½ per cent. A further rise in the group trading profit to £421,000 carries on a long line of previous increases.

Electrical Investments

Company or Board	Nom. Value	Middle price 11th Mar.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1957 Highest	1957 Lowest
Equipment and Manufacturing—continued								
Hoover	5/-	34/-	+1/6	50	50	7 7 0	33/6	24/9
I.C.I.	£1	40/6	—1/9	10	10	4 18 9	43/9	37/9
Intl. Combustion	5/-	25/-	+1/3	20	22½	4 10 0	25/-	20/-
Johnson & Phillips	£1	30/-	—9d	15	15	10 0 0	34/6	28/6
Lancashire Dynamo	£1	43/9		15	11*	5 0 6	45/-	36/9
Laurence, Scott	5/-	16/9		12½	15	4 9 6	16/9	13/9
Lister, R. A.	£1	30/-		9·3	10	6 13 3	30/6	26/9
London Elec. Wire	£1	52/-	+1/6	12½	12½	4 16 3	52/-	43/-
Lucas, J.	£1	33/3	—6d	7½	7½	4 10 3	33/9	30/6
Marryat & Scott	2/-	9/6	+9d	30	30	6 6 3	9/6	8/-
Mather & Platt	£1	53/6		15	15	5 12 3	55/6	51/3
Metal Industries	£1	23/9		9	9	—	25/-	20/3
Midland Elec. Mfg.	£1	46/3		12½	12½	5 8 0	46/3	45/-
Morphy-Richards	4/-	14/-	+1/6	50	50	5 14 3*	14/-	11/9
Murex	£1	70/-	—6d	20	20	5 14 3	71/6	65/-
Newman Ind.	2/-	2/3		10	10	8 17 9	2/6	2/1
Oldham & Son	1/-	2/6		20	17½*	7 0 0	2/6	2/3
Parnall (Yate)	5/-	7/9	—3d	14	12	7 14 9	8/-	5/9
Parsons, C. A.	£1	66/3	+6d	10	10	—	66/3	50/6
Plessey	10/-	75/3	+3/-	27½	30	3 19 9	76/3	61/-
Pye "A" Deferred	5/-	17/-	—1/3	12½	12½	3 13 6	18/3	15/9
Reyrolle	£1	106/3	—1/3	15	16½	3 1 3	107/6	90/-
Rheostatic	4/-	10/-		18½	12½	5 0 0	10/-	8/9
Richardsons Westgarth	5/-	18/9	—3d	16⅝	16⅝	4 9 0	19/-	17/-
Scottish Cables	4/-	19/3		27½	27½	5 14 3	19/3	15/-
Smith (England), S.	4/-	14/9	+3d	17½	17½	4 15 0	14/6	13/-
Southern Areas	£1	17/6		10	7½	8 11 6	20/-	13/9
Strand Elec.	5/-	7/9		15	15	9 13 6	8/-	7/3
Sturtevant	5/-	26/-	+6d	14·4†	15†	2 17 9†	26/-	24/3
Sun Elec.	£1	43/9		20	25	11 8 6	43/9	43/9
Switchgear & Cowans	5/-	15/6	+3d	20	25	8 1 3	15/6	13/6
Taylor Tunnicliff	5/-	12/9	—6d	15	15	5 17 9	13/9	11/9
T.C.C.	10/-	38/9		25	25	6 9 0	38/9	35/-
T.C. & M.	£1	30/-	—1/-	8½	8½	5 13 3	31/-	24/6
Telephone Mfg.	5/-	7/-		10	10*	7 2 9	7/-	6/3
Thorn Elec.	5/-	18/9		15	15	4 0 0	19/6	16/3
Thornycroft	£1	36/3	+1/9	15	12½	6 18 0	36/3	32/9
Tube Investments	£1	58/3	—6d	22½	15*‡	5 3 0	62/-	58/3
Vactric	5/-	15/-		15	17½*	5 16 9	15/-	12/9
Veritys	5/-	9/3		12½	12½	6 15 3	9/3	8/9
Walsall Conduits	4/-	13/3		70	20*	6 0 9	13/3	11/-
Ward & Goldstone	5/-	43/3	+2/-	30	35	4 1 0	43/3	36/9
Watford	2/-	6/6		25	25	7 13 9	6/6	6/3
Westinghouse	£1	80/-		18	18	4 10 0	82/6	72/-
West, Allen	5/-	13/9		15	15	5 9 0	14/3	12/3
Wolf Electric	5/-	17/6		20	20	5 14 3	18/-	17/3
Trusts, Transport and Communications								
Anglo-Portuguese	£1	23/3		8	8	6 17 9	23/3	20/6
Brit. Elec. Traction: Def. Ord. "A"	5/-	20/-	—6d	22½	22½	5 12 6	20/9	17/-
Cable & Wireless: Ord.	5/-	11/6	—6d	10	10	4 7 0	12/-	9/6
4% Loan	100	92½		4	4	4 6 6	92½	89
Calcutta Trams	£1	25/9		75†	8½†	6 12 0†	26/6	22/9
Cape Elec. Trams	£1	15/6		8	8	10 6 6	15/9	14/6
Marconi Marine	£1	33/6	+6d	10	10	5 19 6	33/6	31/-
Oriental Tel. Ord.	1/-	75/6	—2/-	16	—	—	77/6	66/6
Telephone Rentals	5/-	11/-		12½	12½	5 13 9	11/3	10/3

Changes on the Week

Few alterations of any consequence were marked in the group of "atomic power" shares. The tendency over the week was easier, Babcock & Wilcox being 2s 6d lower at 80s, but International Combustion improved further to 25s under the influence of the results published earlier. Plessey went ahead well to 75s 3d. Shares connected with domestic appliances continued to benefit from the good impression made by the Hoover annual report and by the Morphy-Richards half-yearly progress statement; the shares of these two companies each added 1s 6d to previous gains, reaching 34s and 14s respectively. London Electric Wire at 52s, Ward & Goldstone at 43s 3d, and Marryat & Scott at 9s 6d all recorded their best prices of the year, but radio shares turned downwards. A. F. Bulgin were marked up to 5s 6d on the declaration of a 40 per cent dividend, which represents an advance on last year's 50 per cent, allowing for the subsequent scrip issue. Telegraph Condenser were unaffected by the annual results: the dividend is unchanged at 25 per cent.

Ericsson Telephones

The 5s shares of Ericsson Telephones had moved up to over 40s in advance of the annual results and were well maintained after the appearance of the figures. These fully satisfied expectations. With a 12 per cent improvement in the net profit to £715,000 (after tax of £628,000) the company is able to add 2 per cent to the distribution on the ordinary stock without disbursing much more than one-third of the surplus available for dividends and reserves. The total payment of 22 per cent for the year includes 6 per cent in the form of bonus. It is declared free of tax, and is equivalent to a little over 38 per cent, subject to tax. At that rate the gross yield works out at about 4¾ per cent.

Company News

Bylock Electric are paying an unchanged dividend, of 33⅓ per cent, and report little change also in the level of net profits at £35,000 after tax. The 1s shares are quoted at 3s 3d to yield 10¼ per cent. Veritys 5s shares have been little affected by the issue of circulars by the stockholders' committee, and by the chairman of the company. The full report now issued by International Combustion confirms last year's improvement of nearly 10 per cent in the net profits, as a result of which the ordinary dividend is being raised from 20 to 22½ per cent.

REPORTS and DIVIDENDS

Bruce Peebles & Co., Ltd.—The report and accounts for 1956 now issued show a trading profit of £368,418, as compared with £457,904 for 1955, and a net balance, after providing £196,000 for taxation, of £145,958 (against £215,098). General reserve receives £100,000, and, as we have already reported, the ordinary dividend for the year is unchanged at 25 per cent. The balance carried forward is £66,597 (against £59,686 brought in).

Sir William Darling (chairman) states in his review of the year that he retires by rotation from the board, but he has been asked by his fellow directors to remain on the board. Although not active enough to continue as chairman, he would like to retain his connection with the company. At the annual general meeting on 29th March proposals will be submitted authorising an increase in the present number of directors.

Sir William says that the order book was as full at the end of the year as at the beginning: this applied equally to rotating plant and transformers, and this position prevailed notwithstanding an increase in factory output compared with the previous year. The profit from this output was, however, smaller than before as a result of lower prices and higher costs. To some extent these handicaps were overcome by greater production. The electronics research group, the formation of which was forecast in his last statement, is now taking shape. The engagement of qualified staff proceeds apace, and work on a Government contract, which has already begun, will be increased when these new facilities become available in a few months. They are now in a position to extend the activities of this group to the general industrial field.

The Midland Electric Manufacturing Co., Ltd.—The report and accounts for 1956 now issued confirm the figures given in our issue of 1st March. In his statement, Mr. A. Wynn (chairman and joint managing director) says that the accounts for the first time include the subsidiary companies J. H. Tucker & Co., Ltd., and the Kersons Manufacturing Co., Ltd. The reorganisation programme has continued and in the meantime the trading results have received some modest support from these associated companies. They have also acquired a minority interest in the Indian company, the Kersons Manufacturing Co. of India (Private), Ltd., whose manufacturing activities are in Bombay. During the year under review there has been a reduction of profit margins, and in consequence, whilst the consolidated profit shows an increase, the profit of the parent company is somewhat lower than in 1955. The fact that turnover was 10 per cent greater than the record level of that year indicates the impact of these conditions. With regard to the future they have an encouraging volume of orders on hand, and the long-term prospects of the industry continue to be promising.

Veritys, Ltd.—In a letter to stockholders, Mr. R. M. Mair, chairman of the Stockholders' Committee, refers to the extraordinary general meeting convened for 18th March at which resolutions will be submitted calling for the removal of all the directors of the company, other than Mr. P. E. C. Merryfield and Mr. J. A. Robertson, and for the appointment as directors of Mr. R. M. Mair and Mr. J. D. Shepard. He says that the reasons for these proposals are that in recent years Veritys has failed to share in the post-war expansion of the electrical industry and has, in fact, lost ground to its competitors. In the Committee's view only a major reorganisation of the management will enable the company to regain its position in the industry. If Mr. Mair and Mr. Shepard are elected, they will receive the support of Mr. Merryfield and Mr. Robertson in attaining the following objectives:—The appointment of Mr. J. W. Seymour, an industrial consultant and qualified engineer, to investigate Veritys and make independent recommendations as regards management, administration and production methods; the appointment of new executives to reorganise the business and introduce up-to-date methods; the appointment of a chairman unconnected with the present dispute; and the attraction of other progressive business into Veritys.

Mr. G. S. Nott, chairman of the company, has issued his reply to the above statement in the course of which he says that his appointment as chairman was the result of a majority vote by the board. He says that he has never in any way been concerned with any dispute regarding the company except in this present attempt to remove him from the board. Since his appointment he has taken active steps to improve the management of the company. He is quite competent to call in an industrial consultant if and when he considers it necessary and he is also fully qualified to introduce up-to-date methods without having to find and appoint new executives to do it. He has already been in contact with three large electrical organisations who are prepared to give the company substantial orders.

Hoover, Ltd.—The report and accounts for 1956 now issued, confirm the preliminary figures given in our last issue. With these the directors have issued their annual review. In this it is stated that in the interim report covering the first six months' trading it was clearly evident that the restrictions on hire purchase facilities, and the higher rate of purchase tax, together with the imposition of the new tax on irons, were factors which were having a serious effect upon the profit earning capacity. The profit figure for the year is considerably greater than could be anticipated at that time, and this substantial improvement is the result of a considerable uplift in export trade, particularly to dollar markets, correlated to the improved trading position of associated companies overseas and the introduction, in the last quarter of the year, of the new "Constellation" cleaner and the new Hoover "Junior" cleaner, both of which have had an excellent reception at home and overseas. Overseas business increased by 16 per cent over 1955. They have maintained their position as the larger British exporter of cleaners and washing machines and their shares of the total British exports were 71 per cent and 72 per cent respectively.

In the closing months of 1956 the initial production of the new Mark IV f.h.p. motor was undertaken and the reception accorded to it, particularly in overseas markets, has been good.

Reviewing the export market, the report states that sales to Canada and the United States during the year showed appreciable increases, although prices were keen and profit margins narrow. Exports to dollar countries showed an increase of 62 per cent over the previous year.

The Telegraph Condenser Co., Ltd.—The report for 1956 shows a trading balance of £460,026, as compared with £595,756 for the preceding year, and after meeting all charges, including £215,910 for taxation, it is proposed to pay a final dividend of 20 per cent, maintaining the distribution for the year at 25 per cent. The balance carried forward is £136,945 (against £128,781 brought in).

The Rheostatic Co., Ltd.—The consolidated profit for the year to 30th September last is £421,816, as compared with £392,551 for 1954-55, and the net profit of the parent company is £148,175 (against £134,965). General reserve receives £65,000 and it is proposed to pay a final dividend of 7½ per cent, making 12½ per cent for the year on doubled capital. The distribution for the previous year on the old capital was 18½ per cent.

Bylock Electric, Ltd., reports that before providing £43,167 for taxation, the consolidated net profit for the year to 31st July last is £78,807, as compared with £80,496 for the preceding year. The dividend for the year is unchanged at 33⅓ per cent.

A. F. Bulgin & Co., Ltd., report trading profits for the year to 31st January last of £146,448, as compared with £146,455 for the previous year, and after allocating £82,098 for taxa-

FINANCIAL SECTION (*Continued*)

tion, the net balance is £64,350 (against £69,580). General reserve receives £5,000, and it is proposed to pay a dividend of 40 per cent for the year on the combined ordinary and "A" ordinary capital. For the previous year the total distribution was 50 per cent on capital of £100,000 before a one-for-two scrip issue. The balance carried forward is £54,479 (against £29,629 brought in after £46,288 part capitalisation).

Clarke, Chapman & Co., Ltd., report that the trading surplus for 1956 (including £800,000 estimated profits on long-term contracts in respect of other years) is £1,954,645, as compared with £1,399,916 for 1955. After meeting all charges, including £785,471 for taxation, and £200,000 estimated taxation for previous years arising from spread of contract profits, there is a net profit of £755,112 (against £624,618). Reserves receive £580,000 and it is proposed to pay an ordinary dividend for the year of 27½ per cent (against 22½ per cent).

Ericsson Telephones, Ltd.—The trading profit for 1956 is £1,414,061, as compared with £1,165,081 for 1955, and after deducting £628,163 for taxation, the net profit is £715,054 (against £628,163). General reserve receives £300,000 and research and development reserve £200,000. It is proposed to pay a final ordinary dividend of 12 per cent (same), and a bonus of 6 per cent (against 4 per cent), making 22 per cent, tax free, for the year (20 per cent). The balance carried forward is £343,682 (against £356,689 brought in).

E. K. Cole, Ltd., are paying an interim dividend of 7½ per cent (unchanged).

Thos. W. Ward, Ltd., have declared an interim dividend of 5 per cent (unchanged).

Bankruptcies

A. E. R. Honey, 48, Bramerton Road, Beckenham, Kent, electrical contractor, lately carrying on business at that address and at 117, Anerley Road, Penge.—Public examination 2nd May at the County Court, Scarbrook Road, Croydon, Surrey.

G. W. A. Pryke, The Woodlands, Cottage Lane, Nether Whitacre, Coleshill, Birmingham, electrical contractor's manager.—Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham. Official Receiver, released 22nd February.

S. W. Morley, Glade House, Hammerwich, and carrying on business as Morley's at Bow Street, Rugeley, Staffs, radio and electrical engineer.—Supplemental dividend of 4d in the £, payable at the Official Receiver's office, 12, Lonsdale Street, Stoke-on-Trent.

A. Banoff (trading as Almyn Radio Electric Co.), lately carrying on business at 111, Church Road, Hove, Sussex.—Receiving order made 28th February on a creditor's petition. Public examination 26th April at the Court House, Church Street, Brighton, 1.

Liquidation

Bulwell Electric & Radio, Ltd.—Particulars of claims by 29th March to the liquidator, Mr. R. F. Bendall, 126, Colmore Row, Birmingham, 3.

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates do not clash with others already arranged.

Monday, 18th March

BIRMINGHAM.—Grand Hotel, 6.15 p.m. Birmingham Electric Club. "Electrical Drives used in a Modern Steelworks," by R. T. Sartain.

BRISTOL.—Demonstration Theatre, South Western Electricity Board, 6 p.m. I.E.E. Western Supply Group. "Preventive Maintenance: Power Stations," by P. L. Lutte; "Distribution," by A. G. Milne.

CHESTER.—Town Hall, 6.30 p.m. I.E.E. North-Western Centre. "Highland Water Power," by the late T. Lawrie (to be read by a member of the Board). (Joint meeting with the Mersey and North Wales Centre.)

IPSWICH.—Electric House, 7.15 p.m. Ipswich and District Electrical Association. "Aluminium and its Application in the Electrical Industry," by D. Worth.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. informal meeting. Discussion on "What is Limiting the Application of Servo Mechanisms in the Electrical Industry?" opened by C. Ryder.

NEWCASTLE-ON-TYNE. — King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. "Power System Protection, with particular reference to the Application of Junction Transistors to Distance Relays," and "A Dual-Comparator Mho-Type Distance Relay Utilising Transistors," by C. Adamson and L. M. Wedepohl.

READING.—George Hotel, King Street, 7.15 p.m. I.E.E. district meeting. "The Transatlantic Telephone Cable," by R. J. Halsey.

Tuesday, 19th March

CAMBRIDGE. — Cambridgeshire Technical College, Collier Road, 6.30 p.m. I.E.E. Cambridge Radio and Telecommunication Group. "The Organisation and Progress of the Telephone Service," by S. J. Edwards.

COVENTRY.—Electricity Sports and Social Club, Merrick Lodge, St. Nicholas Street. Coventry Electric Club. Annual film show.

EDINBURGH.—Carlton Hotel, North Bridge, 7 p.m. I.E.E. South-East Scotland Sub-Centre. "The Potentialities of Railway Electrification at the Standard Frequency," by E. L. E. Wheatcroft and H. H. C. Barton.

GLOUCESTER. — Fleece Hotel, Westgate Street, 6.30 p.m. I.E.S. Gloucester and Cheltenham Centre. "The New Approach to Interior Lighting Design," by J. M. Waldram.

LEEDS.—1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Utilisation Group. "Power Supply Problems in Coal Mining," by D. C. Graham.

LONDON.—2, Savoy Hill, London, W.C.2, 6.30 p.m. Association of Supervising Electrical Engineers. "The Theory and Practice of Plant Maintenance," by H. V. Mather.

Great George Street, S.W.1, 5.30 p.m. Institution of Civil Engineers. "A Major Power Plan for Yukon River Waters in the Canadian Northwest," by J. M. Wardle.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Utilisation Group. "Electrical Equipment for Rectifier Locomotives," by H. B. Calverley, E. A. K. Jarvis and E. Williams.

North Western Electricity Board Showrooms, St. Peter's Square, 7 p.m. I.E.E. North-Western Graduate and Student Section. "Digital Computers and how they may help the Engineer," by Dr. M. V. Wilkes.

NOTTINGHAM.—College of Arts and Crafts, Waverley Street, 6.30 p.m. I.E.E. East Midland Centre. "The Control and Instrumentation of a Nuclear Reactor," by A. B. Gillespie.

SOUTHAMPTON. — Technical College, 7.30 p.m. Institution of Naval Architects and Institution of Marine Engineers, Southern Joint Branch. "Developments in Marine Electrical Installations with particular reference to A.C. Supply," by A. N. Savage.

YORK.—Royal Station Hotel, 7.30 p.m. A.S.E.E. York Branch. "Co-ordination between Lighting and Decoration," by R. Pye.

Wednesday, 20th March

BELFAST.—College of Technology, 7.30 p.m. Belfast Society of Engineers. "Diesel-Electric Traction," by E. T. Bostock.

LEEDS.—Griffin Hotel, 7.30 p.m. I.H.V.E. Yorkshire Branch. Annual general meeting, followed by "Geo-Thermal Heating in New Zealand," by G. M. Hoyle.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio & Telecommunication Section. "Recent Developments in X-ray and Electron Microscopy with some Applications to Radio and Electronics," by Dr. V. E. Cosslett and C. W. Oatley.

Waterloo Bridge House, S.E.1, 5 p.m. Institution of Post Office Electrical Engineers, London Centre. "Lighting to Assist the Engineer," by D. J. Harris.

47, Belgrave Square, S.W.1, 6.30 p.m. Institute of Physics, London and Home Counties Branch. "Semi-conductors and the New Electronics," by Dr. R. A. Smith.

MIDDLESBROUGH.—Cleveland Scientific and Technical Institution, 6.30 p.m. I.E.S. Tees-side Group. "Town Planning and Lighting Problems," by J. Worthington.

Cleveland Scientific and Technical Institution, Corporation Road, 7.30 p.m. Society of Instrument Technology, Tees-side Section. "Some Aspects of Method Study as Applied to Instrument Maintenance," by D. L. Smith.

NEWCASTLE-ON-TYNE. — King's College, 7 p.m. Society of Instrument Technology, Newcastle Section. "The Choice of Control Settings in Practice," by C. H. Stone.

NOTTINGHAM.—East Midlands Electricity Board's Showroom, Smithy Row, 7.30 p.m. A.S.E.E. Nottingham Branch. Films evening.

PRESTON.—Demonstration Theatre, North Western Electricity Board, 19, Friargate, 7.15 p.m. I.E.S. North Lancashire Group. Annual general meeting. "Recent Developments in Lighting Technique," by J. Jansen.

Thursday, 21st March

CHATHAM. — Medway Technical College, 7.15 p.m. I.E.E. London Graduate & Student Section district meeting. Discussion evening.

CHESTER. — Stafford Hotel, 7.15 p.m. Incorporated Plant Engineers, Merseyside and North Wales Branch. "Welding and Testing of Welds by X-rays," by R. B. Whalley.

DUBLIN.—Trinity College, 6 p.m. I.E.E. Irish Branch. "Variable Speed A.C. Drives," by J. A. V. McEvoy.

EDINBURGH.—George Hotel, 7 for 7.30 p.m. I.E.E. Scottish Centre. Annual dinner.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. "A Cyclotron for Medical Research," by J. W. Gallop, D. D. Vonberg, R. J. Post, W. B. Powell, J. Sharp and P. J. Waterton.

Dorchester Hotel, W.1, 6.30 for 7 p.m. Electrical Wholesalers' Federation. Annual dinner.

MANCHESTER. — Demonstration Theatre, North Western Electricity Board, Town Hall, 6 p.m. I.E.S. Manchester Centre. "Recent Developments in Lighting Techniques," by J. Jansen.

Friday, 22nd March

BIRMINGHAM.—Regent House, St. Philip's Place, Colmore Row, 6 p.m. I.E.S. Birmingham Centre. "Street Lighting from a City Engineer's Point of View," by G. Berry.

KENILWORTH.—Chesford Grange, 8.30 p.m. I.E.E. Rugby Sub-Centre. Engineers' ball. (Jointly with the Rugby Engineering Society.)

LONDON.—Connaught Rooms, Great Queen Street, W.C.2, 12.30 for 1 p.m. British Refrigeration Association. Annual luncheon.

1, Birdcage Walk, S.W.1, 6 p.m. Institution of Mechanical Engineers. Annual meeting.

NEWCASTLE-ON-TYNE. — Old Assembly Rooms, 7 p.m. I.E.E. North-Eastern Centre. Annual dinner and dance.

PORT SUNLIGHT.—Hulme Hall, 7 p.m. I.E.E. Mersey and North Wales Centre. Dinner-dance.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 0d each including postage) will be obtainable after 20th March from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1950

31138. Postmaster General.—Electronic switching circuits. 4th September, 1952. (Cognate application 31139, 21st December, 1950.) (770616.) 31140. Electrical selecting systems. 8th December, 1952. (Addition to 722179.) (770617.)

1952

30205. General Dynamics Corporation.—Recorder comprising means for selectively displaying predetermined images on the screen of a cathode-ray tube. 28th November, 1952. (770151.)

1953

2166. General Dynamics Corporation.—Cathode-ray apparatus. 26th January, 1953. (770152.)

5285. General Electric Co.—Refrigerating systems. 25th February, 1953. (770272.)

7684. Staatsbedrijf der Posterijen, Telegrafie en Telefonie.—Electronic transmitter and receiver for signals in a start-stop code. 19th March, 1953. (770512.)

10034. Isopad, Ltd., and Reik, H.—Electric hotplates. 3rd December, 1953. (770432.)

12825. Kelvin & Hughes, Ltd.—Ultrasonic delay lines. 5th May, 1954. (770397.) 18144. Measuring apparatus employing ultrasonic waves. 31st May, 1954. (770398.)

13369. British Thomson-Houston Co., Ltd.—Electronic control circuits. 13th May, 1954. (770160.)

14014. Tesla, Narodni Podnik.—Cross-bar switch. 19th May, 1953. (770515.)

20495/6. Linolite, Ltd.—Holders for double-ended electric lamps. 25th October, 1954. (770620/1.)

21556. Hoover, Ltd.—Squeeze dryers. 9th July, 1954. (770642.)

25861. British Thomson-Houston Co., Ltd.—Electric lighting fittings. 3rd September, 1954. (770518.)

26405. Electric & Musical Industries, Ltd.—Indicating the amplitude/frequency response of an electrical network. 15th September, 1954. (770280.)

29232. Metropolitan-Vickers Electrical Co., Ltd.—Mass spectrometers. 21st October, 1954. (770434.)

33283. Telefunken Ges. für Drahtlose Telegraphie.—Deflecting coil systems for the electron beams of cathode-ray tubes. 1st December, 1953. (770168.)

33827. Mackie & Co., Ltd., W.—Voltage regulators. 24th November, 1954. (770437.)

34132. Pye, Ltd.—Electrical control device. 3rd December, 1954. (770649.)

35200. General Electric Co.—Control of electric irons. 17th December, 1953. (770522.)

35258. Lincoln Electric Co., Ltd.—Arc welding equipment supplied from a source of a.c. 3rd January, 1955. (770283.)

35755. Mullard Radio Valve Co., Ltd.—A.c. circuit arrangements employing transistors. 5th November, 1954. (Cognate application 808, 11th January, 1954.) (770523.)

36224. Radio Corporation of America.—Multi-element semi-conductor devices. 30th December, 1953. (770285.)

1954

2711. Electrolux, Ltd.—Devices for supporting coiled electric conductors on electrical apparatus. 29th January, 1954. (770652.)

2815. British Thomson-Houston Co., Ltd.—Multi-cavity magnetrons. 20th January, 1955. (770290.)

3091. British Insulated Callender's Cables, Ltd.—Apparatus for marking wires and cables and the like. 1st February, 1955. (770291.)

3361. Welwyn Electrical Laboratories, Ltd., and Browning, J.—Electrical resistors. 22nd March, 1955. (770175.)

3462. General Electric Co., Ltd., and Mitchell, J. M.—Steam turbines. 24th January, 1955. (770528.)

3748. Communications Patents, Ltd.—Radar or visual display apparatus. 3rd February, 1955. (770176.)

6660. Kleinschmidt Laboratories, Ltd.—Electrical permutation selector switch. 8th March, 1954. (770441.)

6667. Kango Electric Hammers, Ltd., and Badcock, D. N. W.—Percussive tools. 1st June, 1955. (770654.)

7063. Automatic Telephone & Electric Co., Ltd.—Gas-discharge tube counting circuits. 2nd February, 1955. (770182.)

8779. Marconi's Wireless Telegraph Co., Ltd.—Electrical hybrids. 8th February, 1955. (770406.) 8780. Switching systems for transmitting aerials. 8th February, 1955. (770407.)

8940. Standard Coil Products Co., Inc.—Ultra-high-frequency signal generator. 26th March, 1954. (770185.)

9842. Swift Levick & Sons, Ltd.—Magnetic focusing apparatus for cathode-ray tubes. 4th April, 1955. (770444.)

10361. Aish & Co., Ltd.—Machines for winding wire on toroidal formers. 8th March, 1955. (770661.)

10550. General Electric Co., Ltd., and Bispham, G. E.—Electrical apparatus of the kind comprising a rigid tube along which electromagnetic waves can be propagated. 5th April, 1955. (770303.)

10742. British Thomson-Houston Co., Ltd.—Power measuring apparatus. 2nd May, 1955. (770447.)

11452. Imperial Chemical Industries, Ltd., and Attkins, R.—Consumable electrodes used in the melting of high melting point metals or alloys. 23rd March, 1955. (770448.)

12243. M-O. Valve Co., Ltd., Goss, T. M., and Robertshaw, R. G.—Magnetrons. 27th April, 1955. (770449.)

12684. Rolls-Royce, Ltd.—Electrical plug and socket connector devices. 29th April, 1955. (770307.)

14087. Telephone Manufacturing Co., Ltd.—Electromagnetic relays. 3rd May, 1955. (770308.)

16086. General Electric Co., Ltd., and Humphrey, R.—Machines for recessing jewel bearings. 31st May, 1955. (770403.)

16087. General Electric Co., Ltd., Humphrey, R., and Toeman, R.—Machines for cutting industrial jewels and the like. 31st May, 1955. (770404.)

16483. Dürrwerke Akt.-Ges.—Tubulous forced-flow, once-through, vapour generating and superheating units. 3rd June, 1955. (770456.)

16932. Fernsch Ges.—Process for transmission of picture by television. 9th June, 1954. (770457.)

17217. British Tabulating Machine Co., Ltd.—Electrical switching devices. 11th June, 1954. (770193.)

18320. Crompton Parkinson, Ltd.—Fixing of lighting fittings. 1st June, 1955. (770676.)

19276. Automatic Telephone & Electric Co., Ltd.—Mounting arrangements for electrical components. 13th July, 1955. (Addition to 737160.) (770199.)

19523. Radio Corporation of America.—Temperature controlled semi-conductor bias circuit. 2nd July, 1954. (770200.)

20724. General Electric Co., Ltd.—Electric hybrid devices. 8th July, 1955. (770317.)

21610. Siemens Bros. & Co., Ltd.—Electric cables and cable joints. 22nd July, 1955. (770206.)

22321. Radio Heaters, Ltd.—Apparatus for electrical induction heating. 25th October, 1955. (770548.)

23463. British Thomson-Houston Co., Ltd.—Electric motor protection. 29th July, 1955. (770466.)

23622. General Electric Co., Ltd., Rudge, T. R., and Taylor, K.—Electrical measuring devices. 12th August, 1955. (770321.)

23840. Telefonaktiebolaget L. M. Ericsson.—High frequency generators comprising electron tubes. 16th August, 1954. (770467.)

23931. General Electric Co., Ltd.—Electric lighting fittings for street lighting. 12th August, 1955. (770549.)

26006. Amp, Inc.—Machines for applying connectors to electrical conductors from a strip of connectors. 8th September, 1954. (770553.)

26687. Waller, E. F.—Electric push-button switches. 15th August, 1955. (770328.)

27641. Hupp Corporation. — Electrical power transmission system. 24th September, 1954. (770684.)

28000. Hughes Aircraft Co.—Direct-viewing storage tube with character writing electron gun. 28th September, 1954. (770333.)

29473. Sautier & Jaeger.—Frequency changing arrangements for combined broadcast sound radio and television sets. 13th October, 1954. (770218.)

31500. Western Electric Co., Inc.—Apparatus for twisting tubing. 1st November, 1954. (770428.) 31501. Mandrels for use in twisting tubing. 1st November, 1954. (770429.)

32337. Ashley Accessories, Ltd.—Electric switches. 7th October, 1955. (770476.)

32636. Cooper, I. J. E.—Electrically heated domestic jugs or other liquid containers. 10th November, 1955. (770477.)

34023/4. Chromatic Television Laboratories, Inc.—Method of and apparatus for undulating rods. 24th November, 1954. (770636/7.)

34174. Westinghouse Electric International Co.—Colour corrected electric discharge lamps. 25th November, 1954. (770343.)

34401. Vigren, S. D., Claesson, P. H. E., and Zander, R. A.—Polarised electromagnetic control devices. 26th November, 1954. (770479.)

34784. Johnson & Phillips, Ltd., and Ashby, R. J.—Apparatus for use in laying submarine cables. 1st December, 1955. (770700.)

35846. British Thomson-Houston Co., Ltd. (General Electric Co.).—Luminescent materials. 10th December, 1954. (770480.)

36549. Sulzer Frères Soc. Anon.—Steam turbine plants employing forced-flow steam generators. 17th December, 1954. (770231.)

36908. Philips Electrical Industries, Ltd.—Circuits for use in automatic telephone exchanges. 21st December, 1954. (770232.)

37570. Collins Radio Co.—Variable inductor-capacitor tuner. 29th December, 1954. (770354.)

1955

1466. Marconi's Wireless Telegraph Co., Ltd.—Echo sounders. 19th September, 1955. (770234.)

4127. International Business Machine Corporation.—Electrical calculating apparatus. 11th February, 1955. (770487.)

5426. Western Electric Co., Inc.—Apparatus for shaping bends in tubes. 23rd February, 1955. (770577.)

5475. General Electric Co.—Dynamo-electric machine. 23rd February, 1955. (770489.)

5566. Woodcock, T. P.—Electrostatic generator. 8th February, 1956. (770578.)

[*Continued on page* 503

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—Western Australian Government Tender Board, Perth. 28th March. Ten sets of railcar power and underfloor equipment. (E.S.B. 5226/57. Ten/24506.)*

Posts and Telegraphs, G.P.O., Melbourne. 11th April. Relay mountings. (E.S.B. 5204/57. Ten/24482.)* 18th April. Protective apparatus. (E.S.B. 5203/57. Ten/24494.)*

Belfast.—21st March. Electrical installation at the Ulster Hall. J. McCandless, consulting engineer, 6, Murray Street.

Belgium. — Ministére de la Defense Nationale de Belgique, Brussels. Electric and diesel motor pumps for petrol distribution systems. (C.R.E. 6520/57. Ten/24692.)*

Bristol.—City Council. 13th April. Electric lamps, transformers and capacitors for the year ending 31st May, 1958. (See this issue.)

Burma.—Union Purchase Board. 20th March. 5,000 electrical cut-outs. (E.S.B. 5733/57. Ten/24543.)* 21st March. 200 6 V batteries. (E.S.B. 5755/57. Ten/24593.)*

Cleethorpes. — Borough Council. 8th April. Street lighting equipment. (See this issue.)

Essex. — County Education Committee. Renewal of electrical installations at Brentwood and Romford County High Schools for Girls. (See this issue.)

Formosa.—Central Trust of China, Taipei. 4th April. Electrical apparatus including transformers, wattmeters, etc. (E.S.B. 5795/57. Ten/24568.)*

India.—Director General of Supplies and Disposals, New Delhi. 23rd April. 33 kV transmission lines. (E.S.B. 5380/57. Ten/24507.)*

Irish Republic.—Office of Works, Dublin. 28th March. One electrically operated derrick, and one 30 kW diesel generator. (E.S.B. 5812/57. Ten/24597.)*

Kincardine.—County Council. 25th March. Electrical work in connection with extensions to the Academy, Mackie. County architect, Westfield House, Stonehaven.

Malta.—Government Director of Contracts. 18th April. Electrical apparatus and equipment for Gozo and Comino electrical distribution scheme. (See this issue.)

Newcastle-on-Tyne.—City Council. 25th March. Supply and installation of an electrically operated lift at the new home for the infirm, Montagu estate. City architect, 18, Cloth Market.

Newport (Salop).—U.D.C. 5th April. Electrically driven submersible pump unit, complete with switchgear, together with the provision of a similar unit for standby purposes, at pumping station. A. H. S. Waters and Partners, engineers, 25, Temple Row, Birmingham, 2.

New Zealand.—Stores Division, G.P.O., Wellington. 11th April. Ammeters. (E.S.B. 5330/57. Ten/24468.)*

Rhodesia and Nyasaland.—Federal Tender Board, Causeway. 29th March. Private automatic branch exchanges. (E.S.B. 5713/57. Ten/24605.)* 12th April. Radio transmitter and ancillary equipment. (E.S.B. 5156/57. Ten/24476.)*

Purchasing Board, Rhodesia Railways, Bulawayo. 9th April. Telephone line contact rods. (E.S.B. 5534/57. Ten/24521.)*

Rothwell.—U.D.C. 6th April. Street lighting equipment. (See this issue.)

South Africa.—Union Tender and Supplies Board, Pretoria. 21st March. 6,600 V and 660 V armoured cable. (E.S.B. 5515/57. Ten/24514.)* 28th March. Copper strip. (E.S.B. 5381/57. Ten/24485.)* "No-break" standby power equipment. (E.S.B. 5345/57. Ten/24470.)* Jointing sleeves. (E.S.B. 5382/57. Ten/24488.)* One 10 kW h.f. radio transmitter. (E.S.B. 5296/57. Ten/24518.)*

Durban City Council. 29th March. Two 15 MVA transformers. (E.S.B. 5167/57. Ten/24498.)*

Stores Department, South African Railways, Johannesburg. 3rd April. Four 100 kVA transformers. (E.S.B. 5632/57. Ten/24519.)*

Thornaby-on-Tees (Yorks).—Corporation. 22nd March. Laying of 2,400 yd of electric cable for street lighting purposes on trunk road A.67. Borough engineer, Town Hall.

United States.—Bureau of Reclamation, Denver. 28th March. Supervisory control and telemetering equipment. (E.S.B. 6412/57. Ten/24679.)*

Public Utility District, No. 1 (Chelan County), Washington. 29th March. Seven 120,000 kVA transformers. (E.S.B. 6409/57. Ten/24687.)*

Uruguay.—Administracion Nacional de Combustibles Alcohol y Portland. 9th April. 260 electric petrol pumps. (E.S.B. 5086/57. Ten/24542.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

ORDERS PLACED

Barry. — Corporation. Recommended. Installation of electrical equipment for auditorium and stage at the Memorial Hall (£2,557).—Strand Electric & Engineering Co.

Chelmsford.—Essex County Council. Electrical engineering services at the Mid-Essex Technical School (£10,774).—Alpha Manufacturing & Electrical Co.

Derby.—Education Committee. Electrical installation work at Hardwick School (£1,035).—East Midlands Electricity Board.

Shipley.—Housing Committee. Installation of power points in 120 houses (£1,318).—P. W. Edmondson.

Spalding.—Regional Hospital Board. Rewiring of electrical services at Johnson Hospital, Spalding (£1,797).—G. Clifton & Co.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Block of 10-storey flats; G. Keith, city architect, Broad Street, Castlegate.

Acton.—Development of the Central Middlesex Hospital, N.W.10, including engineering and heating work (£182,000); regional architect, North West Metropolitan Regional Hospital Board, Sheffield House, Sheffield Street, London, W.C.2.

Alnwick.—Houses (25); Reavell & Cahill, Lloyds Bank Chambers.

Alston.—Hotel (£25,000); Samuel Talbot, Team Valley Trading Estate, Gateshead.

Birkenhead.—Houses (500), Central Woodchurch estate, Upton By-pass site and Grangefield site; borough architect, 3, Conway Street.

Burton-on-Trent.—Workshop block for Technical College; Richard Sheppard & Partners, architects, 5, Southampton Place, London, W.C.1.

Carlisle.—Depot for Cumberland Highways Division (£40,000); county architect, Portland Square, Carlisle.

Additions to Creighton Secondary School (£10,000); J. F. Johnston, builder, Harraby, Carlisle.

Charlbury.—Secondary modern school; C. Pether & Son, Ltd., builders, Burford, Oxon.

Chester-le-Street.—Houses (32), Sacriston, for R.D.C.; Whittal, Ltd., builders, Pilgrim Street, Newcastle-on-Tyne.

Corby.—Second phase of College of Further Education (£255,195); county architect, County Offices, Guildhall Road, Northampton.

Dwellings (600), Beck Green estate; Corby Development Corporation, Stone House, South Road.

[*Continued on next page*

NEW PATENTS (*continued*)

7221/2. Philips Electrical Industries, Ltd.—Electricity meters. 11th March, 1955. (770629/30.)

7947. Standard Telephones & Cables, Ltd.—Cooling systems for electronic tubes. 18th March, 1955. (770580.)

11093. Usselmann, F.—Electrical control mechanism for controlling drive connection between a driving shaft and at least two driven shafts. 18th April, 1955. (770718.)

13078. Siemens & Halske Ges.—Electric furnace. 8th October, 1953. (Divided out of 770401.) (770402.)

14110. General Electric Co.—Rotor construction for compressors or turbines. 16th May, 1955. (770249.)

14846. Metallges. Akt.-Ges., and Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler.—Nuclear reactors. 23rd May, 1955. (770252.)

14860. Hercules Powder Co.—Use of nuclear fission in synthesising organic compounds. 23rd May, 1955. (770594.)

15373. Philips Electrical Industries, Ltd.—Circuit arrangements for converting low voltages into high direct voltages. 27th May, 1955. (770253.)

15532. United States Rubber Co.—Battery separator and method of making same. 31st May, 1955. (770730.)

15700. Standard Telephones & Cables, Ltd.—Adiustors for relatively adjusting two lengths of wire, strip, or the like. 1st June, 1955. (770257.)

16369. Soc. Anon. de Télécommunications.—Self-supporting electric cables. 7th June, 1955. (770601.)

16702. Allmanna Svenska Elektriska Aktiebolaget.—Electric arc furnace equipment. 10th June, 1955. (770740.)

16932. Haefely & Cie Akt.-Ges., E.—Multi-stage cascade rectifier circuits. 13th June, 1955. (770605.)

17553. Piles Wonder.—Cylindrical electric dry batteries. 17th June, 1955. (770607.)

18703. Metropolitan-Vickers Electrical Co., Ltd.—Circuit arrangements for supplying d.c. networks from an a.c. source. 28th June, 1955. (770614.)

Coseley.—Houses (114), Wallbrook and Parkfield West sites; J. C. Roper, clerk to U.D.C., Council House, Coseley, Staffs.

Coventry.—Retail market in the central area (£338,338); A. G. Ling, city architect, Bull Yard, off Warwick Row.

Works and offices for Coventry Newspapers, Ltd., Corporation Street; Higgs & Hill, Ltd., builders, Crown Works, South Lambeth Road, London, S.W.8.

Darlington. — Conversion of Blackwell Grange into school (£42,500); E. A. Tornbohm, borough architect.

Denham.—Dwellings (36) for Licensed Victuallers' Benevolent Institution; Waite & Waite, architects, 36, Cavendish Square, London, W.1.

Derbyshire.—Extensions to Hope Valley County Secondary School (£142,142) and North Wingfield Deincourt School (£149,150); county architect, Matlock.

Durham.—Fire station at Fence Houses (£33,000); H. F. Mole & Co., Ltd., builders, Chester-le-Street.

Houses (50), Sunderland Road; city surveyor.

Houses (30); R.D.C. surveyor.

Exeter.—Houses (110), Dunsford Road; H. B. Rowe, city architect, Municipal Offices.

Gainsborough.—Hostel for old people in Morton Terrace for Lindsey County Council (£41,590); Bernard Pumfrey, Ltd., Gainsborough.

Hawick.—New factories and plant (£45,000); Lyle & Scott, Ltd., Lothian Street.

Hebburn.—Three county schools; county architect, Durham.

Hyde.—Flats (54), and houses (46), Rosemount estate; Thomas Cooper, borough engineer, Municipal Buildings.

Ipswich.—Ward buildings, kitchen, etc., at Ipswich and East Suffolk Hospital (£300,000); East Anglian Regional Hospital Board, 33, Parkside, Reading.

Dwellings (72), Chantry estate; borough engineer.

Jarrow.—R.C. church, York Avenue; R. Burke, 10, Lambton Road, Newcastle.

Kettering.—Houses (22), Windmill Avenue; Drabble Construction, Ltd., Pytchley Road.

Newcastle-on-Tyne.—Youth centres on the North Kenton and Fawdon estates; city architect, 18, Cloth Market.

Offices, workshops and stores, Westgate Road; M. Gatoff, 26, Mosley Street.

Thirty-six flats and maisonnettes, Longbenton estate; J. H. Fisher & Co., Ltd., builders, Lansdowne Terrace.

Secondary modern school at Kenton; Spence & Price, St. Mary's Place, Newcastle.

North Shields.—Houses (16), Kennersdene Park estate; C. Dunleavy, builder, Cullercoats.

Northwich.—Offices, Moss Road; Imperial Chemical Industries, Ltd., Winnington.

Perth.—Flats (88), Pomarium Street district; burgh surveyor.

Peterlee (Co. Durham).—Houses (208), Acre Rigg, for Peterlee Development Corporation; Lane, Fox & Co., Ltd., builders, High Barnes Works, Sunderland.

Reading.—Flats (40), Brunswick Street; G. F. Darlow, town clerk, Town Hall.

Redcar.—Bungalows (32), Staintondale Avenue; K. W. Ash, borough engineer.

Ryton-on-Tyne.—Houses (300); U.D.C. surveyor.

South Shields.—Swimming baths; John Reid, borough engineer.

Factory and offices, Derby Street, for Elsy & Gibbons, Ltd.; Page, Son & Hill, architects, 75, King Street.

Housing developments near Harton Lane for Church Commissioners; Smiths, Gore & Co., surveyors, Bondgate, Darlington.

Wallsend.—Extensions to works and plant (£500,000); North Eastern Marine Engineering Co., Ltd.

Three blocks of flats (£297,199); G. Wimpey & Co., Orchard House, Newcastle, 2.

West Stanley.—Houses (94) (£141,675); U.D.C. surveyor, Stanley, Durham.

STREET LIGHTING SCHEMES

Bournemouth Highways and Works Committee's capital programme of main road lighting to be carried out during the forthcoming financial year is estimated to cost £10,000.

A new installation of 424 "Osram" 140 W integral sodium lamps is now in operation in the Rhymney and Sirhowy Valley, Monmouthshire, where there is heavy traffic and movement of people on shift work from surrounding collieries and steelworks. The lamps were supplied to the **Bedwellty** U.D.C. by the General Electric Co., Ltd.

Croydon Highways and Street Services Committee reports that a contract has been placed for the first stage of the five-year programme of work for improving the general standard of street lighting in the borough, and the Committee has now considered a list of roads to be included in the second stage. The total cost of the work is estimated at £100,000, and the Committee has recommended that application be made for loan sanction to cover the cost.

Doncaster Watch Committee has recommended that schemes of new and improved street lighting estimated to cost nearly £9,000 shall be carried out during the next financial year.

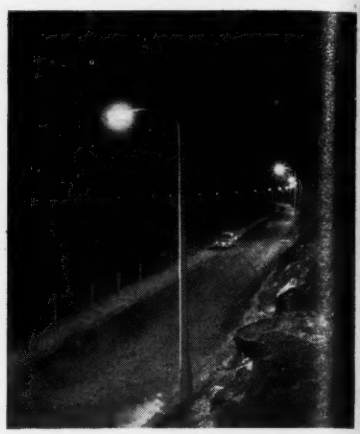
Felling (Co. Durham) U.D.C. has received sanction from the Ministry of Transport and Civil Aviation to install street lighting in Shields Road, Pelaw (£5,143) and in Watermill Lane and High Lane, Heworth (£2,610).

Kirkcaldy Town Council has approved a street lighting programme which will cost £125,000 over the next eight years.

Newburn-on-Tyne U.D.C. is considering a £12,400 street lighting extension scheme.

Newcastle-on-Tyne City Council has received sanction to borrow £2,775 for the provision of electric street lighting on Kenton North estate, Newcastle.

At a meeting of **Peterlee (Co. Durham)** Parish Council, it was reported that the cost of lighting Essington Way/Yoden Way would be about £12,000, which would be borne by the Ministry of Transport. The road runs from Horden through the centre of Peterlee to the industrial site.



New sodium lighting installation in the Rhymney and Sirhowy Valley, Mon.

The Ministry of Transport is expected to make a 50 per cent grant towards the **Thornaby-on-Tees (Yorks)** Town Council's scheme for improving the lighting of Middlesbrough Road. The cost is estimated at nearly £10,000 and contracts will be let shortly for the supply of the necessary equipment.

Scarborough Town Council is seeking sanction to borrow £12,255.to continue its programme for converting street lighting from gas to electricity. The Council is also applying for permission to borrow £9,356 for converting the lighting in Seamer Road; tenders for the work have been received and are being considered by the Ministry of Transport.

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 27th March:—

ELASTOSIL. No. 745,792. Class 7. Dynamos, dynamo brushes, brake linings (not for vehicle brakes), driving belts for machines, motors (not for land vehicles), sparking plugs, etc.—Wacker-Chemie, G.m.b.h., Munchen, Germany. Address for service, c/o Abel & Imray, Quality House, Quality Court, Chancery Lane, London, W.C.2.

ARROSTARTER. No. 757,949. Class 7. Starters for electric motors (not for land vehicles).—Arrow Electric Switches, Ltd., Hanger Lane, Ealing, London, W.5.

ROLLS. No. 741,908. Class 9. Electric switches.—Rolls Switches, Ltd., 154, Blackfriars Road, London, S.E.1.

DATEX. No. 755,467. Class 9. Electric and electronic apparatus for use in the calculation and furnishing of data and statistical information.—G. M. Giannini & Co., Inc., New York, U.S.A. Address for service, c/o Boult, Wade & Tennant, 112, Hatton Garden, London, E.C.1.

SERVISCOPE. No. 756,784. Class 9. Oscilloscopes and oscillographs.—Telequipment, Ltd., 313, Chase Road, Southgate, London, N.14.

GRAMECK. No. 756,957. Class 9. Sound recording and sound reproducing apparatus and instruments, magnetic tape for use as sound recording and reproducing media, and parts.—W. H. Sanders (Electronics), Ltd., Gunnels Wood Road, Stevenage, Herts.

TERAMEL. No. 759,456. Class 9. Enamel-coated wire and enamel-coated metal strip, all for electrical purposes.—British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, Strand, London, W.C.2.

POROTEC. No. 760,148. Class 9. Electrical apparatus for use in the detection of gas porosity in molten metal.—Foundry Services, Ltd., 285, Long Acre, Nechells, Birmingham, 7.

MINIVAC. No. 760,191. Class 9. Electric vacuum cleaners.—Pifco, Ltd., Pifco House, Watling Street, Manchester, 4.

VACBRUSH. No. 760,218. Class 9. Vacuum cleaners (electric) and parts.—N.S.F., Ltd., National Switch Factory, Keighley, Yorks.

KELAND. No. 760,436. Class 9. Radio and television apparatus; electric transformers; electric amplifiers; and parts.—Keland Ltd., Conhope Works, Condercum Road, Newcastle-upon-Tyne, 4.

MINUET. No. 760,618. Class 9. Radio receiving sets.—Kolster Brandes, Ltd., Cray Works, Sidcup, Kent.

ENDACRINETTE. No. 756,574. Class 10. Electronic apparatus for use in the treatment of the pituitary gland.—W. H. Perkins, trading as Medetronics, 14, Winton Crescent, Croxley Green, Rickmansworth, Herts.

CONSTELLATION. No. 758,311. Class 11. Installations for lighting, heating, steam generating and cooking.—Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.

ELTRASANT. No. 759,324. Class 11. Electrical cooking and heating apparatus and electric heating elements therefor.—Eltrakommanditgesellschaft Leicht & Trambauer, Hessen, Germany. Address for service, c/o W. P. Thompson & Co., 12, Church Street, Liverpool, 1.